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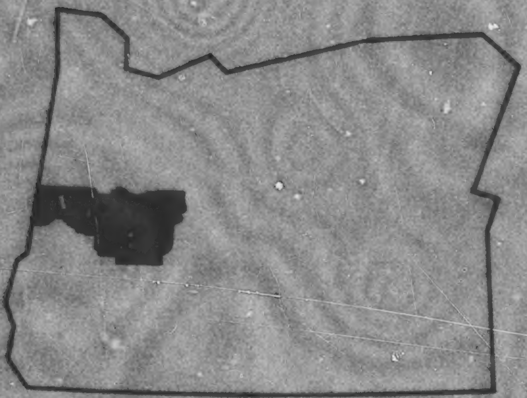
# FLOOD INSURANCE STUDY

ORIGINAL

COMPLETED
82

## CITY OF EUGENE, OREGON
## LANE COUNTY



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Federal Emergency Management Agency

COMMUNITY NUMBER - 410122

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

# FLOOD INSURANCE STUDY

## 1.0 INTRODUCTION

### 1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Eugene, Lane County, Oregon, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

### 1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by CH2M HILL Northwest, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. H-4582. This study was completed in July 1983.

### 1.3 Coordination

Streams requiring detailed or approximate study were identified at a meeting attended by representatives of the study contractor, FEMA, and the City of Eugene in June 1977.

On February 23, 1984, a review draft of the study was presented to the community at an intermediate coordination meeting attended by representatives of the study contractor, FEMA, and the City of Eugene. Several items were brought to the attention of the study contractor. Each of these involved new developments within the flood plain or floodway that occurred after the meeting held in June 1977. These items have been resolved and are included in this study.

Results of the hydrologic analyses on Amazon Creek were coordinated with the U.S. Army Corps of Engineers (COE). The COE was contacted for information concerning this study.

The results of the study were reviewed at the final meeting held on June 11, 1985, and attended by representatives of the study contractor, FEMA, and the community. All problems raised at that meeting have been resolved in this study.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the City of Eugene, Lane County, Oregon. The area of study is shown on the Vicinity Map (Figure 1).

Portions of unincorporated Lane County within Eugene were not included in this study.

Flooding caused by overflows of the Willamette River, Dedrick Slough, Amazon Creek, Amazon Creek Split-Flow, Q-Street Canal, the McKenzie River, and Channel A3 within the corporate limits of Eugene were studied in detail.

Channel A2 was also studied by detailed methods. However, flooding on this stream was found to be extremely narrow, and was entirely contained in the channel. Therefore, Channel A2 was not included in this study.

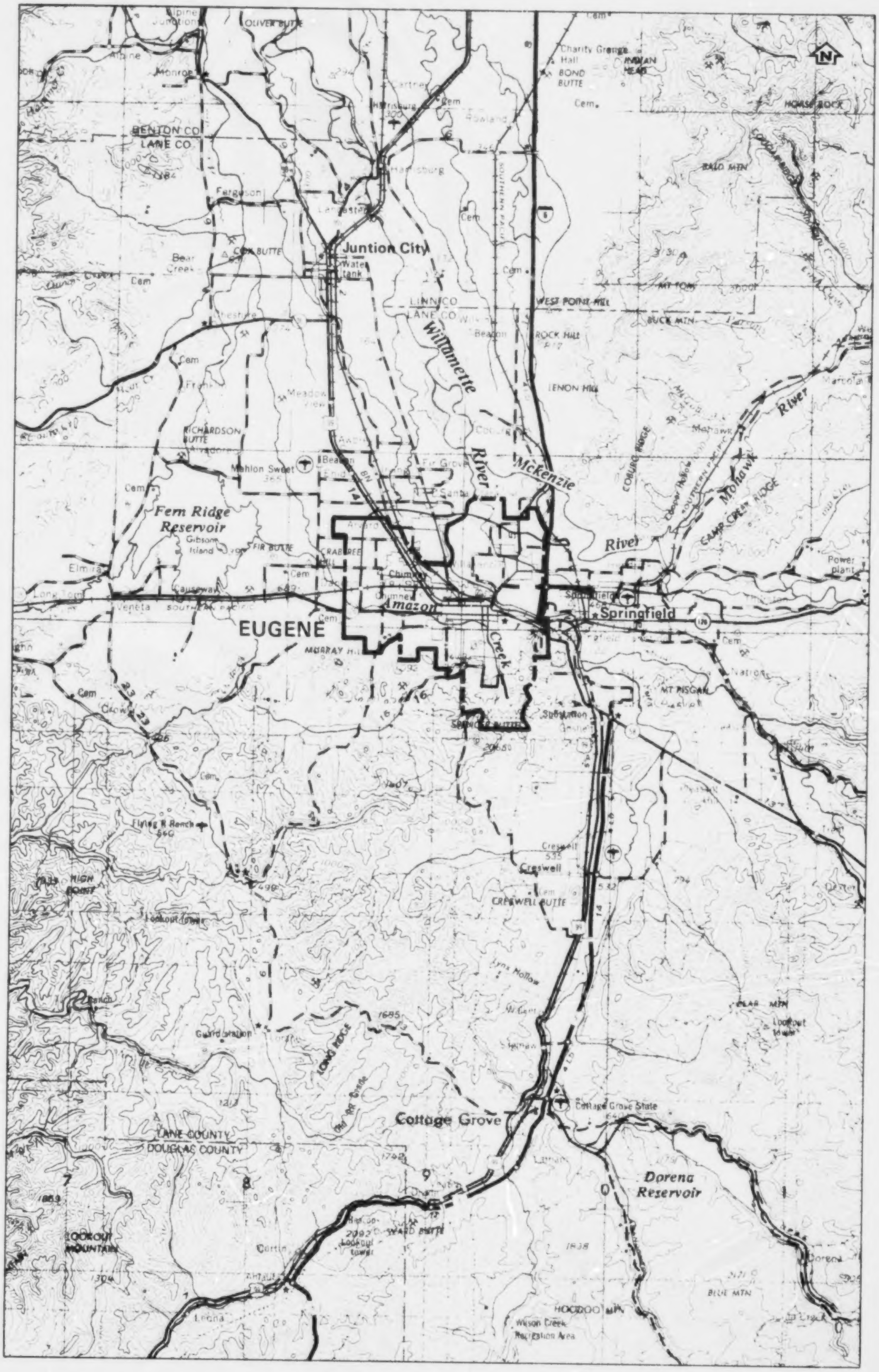
The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through 1988.

Flooding on Willow Creek within the corporate limits was studied by approximate methods.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the City of Eugene.

### 2.2 Community Description

The City of Eugene is located at the head of the Willamette Valley in central Lane County, in western Oregon. Eugene is bordered by unincorporated areas of Lane County to the north, west, and south, and is adjacent to the City of Springfield to the east. Eugene is approximately 130 miles south of Portland. The Willamette Valley lies north of Eugene, flanked by the Coast and Cascade Mountains.


Alpine Junction
OLIVER BUTTE
Alpine
Monroe
Charity Grange Hall
BOND BUTTE
INDIAN HEAD
Harrisburg
HORSE ROCK
BENTON CO
LANE CO.
Ferguson
BALD MTN
Lancaster
Junction City
Water tank
Bear Creek
COX BUTTE
MT TOM
LINN CO
LANE CO.
WEST POINT HILL
Cheshire
Beacon
ROCK HILL
BUCK MTN
Willamette River
LEMON HILL
Marcola
RICHARDSON BUTTE
Mahlon Sweet
Fir Grove
Mckenzie River
Mohawk River
COBURG RIDGE
CAMP CREEK RIDGE
Fern Ridge Reservoir
Gibson Island
FIR BUTTE
Elmira
Power plant
Veneta
Amazon Creek
Springfield
EUGENE
MURRAY HILL
MT PISGAH
SPENCER BUTTE
Flying R Ranch
HIGH POINT
Lookout tower
Creswell
CRESWELL BUTTE
Guard station
LONG RIDGE
Cottage Grove
Cottage Grove State
LANE COUNTY
DOUGLAS COUNTY
Dorena Reservoir
LOOKOUT MOUNTAIN
WARD BUTTE
Dorena
BLUE MTN
HOODOO MTN
Wilson Creek Recreation Area

APPROXIMATE SCALE

5 0 5 10 15 MILES

## VICINITY MAP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

FIGURE 1

Most of Eugene lies in the alluvial plain of the valley at an elevation of approximately 425 feet; the remaining area extends into the hills to the south. The total land area contained within the city limits is 32.9 square miles. The population increased from 50,977 in 1960 to 105,624 in 1980 (Reference 1).

The Willamette River, formed by the confluence of the Middle Fork and Coast Fork Willamette Rivers 2 miles south of the city, flows northwesterly through the center of Eugene. It drains an area of approximately 2,030 square miles at the State Highway 126 crossing, approximately 185 miles upstream of its mouth. Dedrick Slough flows parallel to the Willamette River and, at flood stage, acts as an overflow channel for the Willamette River.

Amazon Creek originates in the hills south of Eugene and then flows northerly to the center of the city, where it turns westerly toward Fern Ridge Reservoir. At the diversion structure just west of the corporate limits, part of the flow is diverted toward the reservoir. The remainder flows northwesterly to the Long Tom River. Amazon Creek drains 21.3 square miles at the diversion, most of it lying within the corporate limits.

Channel A3 flows westerly through northwestern Eugene to its confluence with Amazon Creek. It drains an area of approximately 2.6 square miles.

Q-Street Canal flows westerly through eastern Eugene to its confluence with the Willamette River. It drains an area of approximately 7.5 square miles. Within the corporate limits of Eugene, Q-Street Canal is included in the Willamette River flood plain.

North of Eugene, the McKenzie River flows westerly. It drains an area of approximately 1,337 square miles.

Development within the flood plains studied is mostly residential, but there are many businesses along Amazon Creek. Much of the vacant land within the corporate limits lies in flood plains on Goodpasture Island (Reference 2).

Native vegetation, where not cultivated, consists primarily of Douglas-fir, Oregon white oak, madrone, blackberries, shrubs, and grasses. Near the streams, black cottonwood, bigleaf maple, Oregon ash, and alder are found.

Eugene has a temperate, marine climate, with temperatures ranging from an average of 67°F in July to 40°F in January. Average annual precipitation is 39 inches, with an average recorded snowfall of 7 inches. The average monthly precipitation exceeds 5 inches from November to February; from June to October, it is less than 2 inches

(Reference 3). The soils consist mainly of impermeable silty clay loam over a substratum of sedimentary rock (Reference 4).

## 2.3 Principal Flood Problems

Major flooding occurs in Eugene in December and January as a result of heavy rain and snowmelt. The major area of flooding is referred to as Goodpasture Island. Overflow from the Willamette River causes flooding in Dedrick Slough near Goodpasture Island.

A major flood occurred on the Willamette River in December 1964. The discharge associated with this event was established as 60,400 cubic feet per second (cfs) at the discontinued U.S. Geological Survey (USGS) gage No. 14158000, by the COE (Reference 5). This gage was located on the downstream side of the State Highway 126 bridge at Springfield, and records were kept until 1977 (References 6, 7, and 8). The estimated return period for a flood of this magnitude is 55 years. The estimated 100-year flood discharge is 71,000 cfs (Reference 9).

Recent major floods occurred on Amazon Creek in February 1961 and December 1964. Discharges associated with these events are 3,070 cfs and 2,040 cfs, respectively. They were measured at USGS gage No. 14169500, located 250 feet upstream from the diversion structure (References 6, 7, and 8). The estimated return period for floods of these magnitudes are 6 years and 2 years, respectively. The estimated 100-year flood discharge at gage No. 14169500 is 5,050 cfs.

Flooding on Q-Street Canal and Channel A3 is normally confined to the channel. Historical data on these drainages are not available.

## 2.4 Flood Protection Measures

Levees and flood-control reservoirs are the main protection measures for Eugene. Five reservoirs operated by the COE within the Willamette River Basin upstream of Eugene provide major flood protection. These reservoirs are summarized in Table 1 (Reference 10). Other flood protection measures are the channel improvements on Channel A3, Amazon Creek, and Q-Street Canal.

The five reservoirs shown in Table 1 have a significant combined effect on reducing major floodflows on the Willamette River throughout Eugene. The 100-year floodflow is reduced from 193,000 to 71,000 cfs, and the 500-year floodflow is reduced from 253,000 to 111,000 cfs.

Channel A3 contains the 100-year flood. A levee improvement constructed on the lower Amazon Creek will not contain the 100-year floodflow. Q-Street Canal is located within the 100-year backwater flooding of the Willamette River.

Table 1. Summary of Reservoirs

| Reservoir | Stream | Flood Control Storage (acre-feet)[1] | Completion Date by COE |
|---|---|---|---|
| Cottage Grove | Coast Fork Willamette River | 30,000 | 1942 |
| Dorena | Row River | 70,500 | 1949 |
| Lookout Point | Middle Fork Willamette River | 337,000 | 1953 |
| Hills Creek | Middle Fork Willamette River | 200,000 | 1961 |
| Fall Creek | Fall Creek | 115,000 | 1965 |

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[1] Total Usable Volume for Flood Storage

As a nonstructural flood protection measure, a city ordinance was enacted to control development in identified flood-prone areas.

## 3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

### 3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

Regulated discharge values for the Willamette River at Eugene were determined by the COE as the result of a request by FEMA to update the hydrology on regulated streams in Lane County (Reference 9).

Stream gage records for the Willamette River were statistically analyzed using standard log-Pearson Type III methods, as outlined by the U.S. Water Resources Council (Reference 11). A natural discharge-frequency curve was developed for USGS gage No. 14158000 on the Willamette River at Springfield. A regulated discharge-frequency curve was then prepared using COE flood-routing computations for the five upstream storage projects in order to reduce expected flood discharges. The regulated discharge-frequency curve was then used to obtain discharge values for the selected recurrence intervals used in this study.

Discharges on Dedrick Slough were based on overflows from the Willamette River at the upstream confluence of the two streams.

Discharges on the McKenzie River were determined by log-Pearson Type III methodology (Reference 11), using discharge-frequency curves developed from data for USGS gage No. 14165500.

The flows for Amazon Creek, Channel A3, and Q-Street Canal were determined by the method presented in An Approach to Estimating Flood Frequency for Urban Areas in Oklahoma (Reference 12), which considers the percentages of storm-sewered and impervious areas.

The drainage areas were measured on USGS topographic maps (Reference 13).

Peak discharge-drainage area relationships for each stream studied in detail are shown in Table 2.

## 3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Water-surface elevations of floods of the selected recurrence intervals were computed through the use of the COE HEC-2 step-backwater computer program (Reference 14).

Cross sections for the backwater analyses of Amazon Creek, Amazon Creek Split-Flow, Channel A3, and Q-Street Canal were determined from "as-built" plans (References 15, 16, and 17). In certain areas, field measurements were obtained to verify the accuracy of the plans.

Cross sections for the backwater analyses of the Willamette River, the McKenzie River, and Dedrick Slough were obtained by field measurements and 1:4,800-scale topographic maps (Reference 18). Aerial photographs (Reference 19) were initially used to determine the best location for the cross sections. Field reconnaissance verified that the cross sections were in the best location for accurately predicting flood elevations. All bridges and culverts were field measured to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the streams and flood plain areas. Roughness values for the main channel of the Willamette and McKenzie Rivers

## Table 2. Summary of Discharges

| Flooding Source and Location | Drainage Area (Square Miles) | Peak Discharges (cfs) | | | |
|---|---|---|---|---|---|
| | | 10-Year | 50-Year | 100-Year | 500-Year |
| Amazon Creek | | | | | |
| USGS Gage No. 14169500 | 21.3 | 3,380 | 4,510 | 5,050 | 6,200 |
| Below Confluence With Willow Creek | 19.3 | 3,100 | 3,390 | 3,530 | 5,610 |
| At Garfield Street | 9.9 | 1,550 | 2,060 | 2,310 | 2,840 |
| At 19th Avenue | 6.8 | 1,200 | 1,500 | 1,590 | 1,930 |
| At Snell Avenue | 1.3 | 200 | 260 | 290 | 360 |
| Channel A3 | | | | | |
| At Confluence With Amazon Creek | 2.6 | 502 | 676 | 757 | 935 |
| At Bertelson Road | 1.7 | 416 | 547 | 609 | 740 |
| Q-Street Canal | | | | | |
| At Confluence With Willamette River | 7.5 | 1,530 | 2,020 | 2,240 | 2,850 |
| At Centennial Boulevard | 6.5 | 1,435 | 1,870 | 2,080 | 2,630 |
| Willamette River | | | | | |
| At State Highway 126 (Flow Unchanged through Eugene) | 2,030 | 40,000 | 59,000 | 71,000 | 111,000 |
| Dedrick Slough | | | | | |
| At Beltline Road | N/A | 800 | 5,500 | 9,000 | 19,000 |
| McKenzie River | | | | | |
| At USGS Gage No. 14165500 | 1,337 | 61,400 | 78,000 | 89,900 | 125,400 |
| Amazon Creek Split-Flow | | | | | |
| At Confluence with Amazon Creek | N/A | N/A | N/A | N/A | N/A |

ranged from 0.030 to 0.055 overbank roughness values ranged from 0.040 to 0.060. Roughness values for Dedrick Slough were estimated as 0.045 in the channel and ranged from 0.055 to 0.060 in the overbanks for all floods. A roughness value 0.031 was used for the main channel of Channel A3; an overbank roughness value of 0.040 was used. Roughness values for the main channel of Amazon Creek and Amazon Creek Split-Flow ranged from 0.020 to 0.035, flood plain values ranged from 0.040 to 0.045. Roughness values for the channel of Q-Street Canal ranged from 0.020 to 0.035.

The acceptability of all assumed hydraulic factors, cross sections, and hydraulic structure data was checked by computations that duplicated maximum water surface observed during the December 1964 flood.

Starting water-surface elevations for Channel A3, the Q-Street Canal, the Willamette River, the McKenzie River, and Amazon Creek were calculated using the slope-area method. The starting water-surface elevation for Dedrick Slough was determined from the backwater elevations of the Willamette River at its confluence. The starting water-surface elevation for the Amazon Creek Split-Flow was determined using the known water-surface elevation for Amazon Creek.

Only the 100-year flood on Amazon Creek Split-Flow was computed. No 500-year elevations on Amazon Creek were computed. The flood causes sheet flow over a large area. This type of flooding requires complicated methods to determine elevations, and such methods are beyond the scope of this study.

The 100-year flood elevations on Amazon Creek and Amazon Creek Split-Flow on the upstream side of the Southern Pacific Railroad reflect ponding outside the levee that is unable to overtop the levee or railroad embankment.

Because of the nature of flooding on Q-Street Canal, which consists entirely of backwater from the Willamette River within Eugene, and Channel A3 downstream of Bertleson Road, where flooding was contained in the channel, flood profiles were not shown.

Shallow flooding occurs along Amazon Creek between Jefferson and Chambers Streets. The extent of shallow flooding was determined by normal-depth calculations, field inspection, and engineering judgment.

Approximate water-surface elevations on Willow Creek were determined by normal-depth calculations, supplemented with field inspection.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetec Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps.

## 4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

### 4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by the FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800, with a contour interval of 2 feet (Reference 18), and using stereo pairs of aerial photographs at a scale of 1:12,000 (Reference 19).

The 100- and 500-year flood plain boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the section of Channel A3 where the stream is designated "Zone A Contained in Channel," the 100-year flood plain boundaries are based on the existing channel alignment and right-of-way.

For the stream studied by approximate methods, the 100-year flood plain boundary was developed from normal-depth calculations, field inspection, and available topographic maps (References 13, 18, and 19). For the stream studied by approximate methods, only the 100-year flood plain boundary is shown.

## 4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 3).

A floodway was not computed for Q-Street Canal because the 100-year flood is contained within the channel. A floodway was not computed for Channel A3 because the 100-year flood is contained within the channel for most of the stream. The only portion of Channel A3 in which the 100-year flood is not contained in the channel is an area called Teitzel Lake. This lake is a wetlands conservation area that is protected by State law from development; thus, a floodway here is not applicable.

The floodways for Amazon Creek downstream of Bailey Hill Road and for Amazon Creek Split-Flow were computed with the levees in a failed condition.

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year flood plain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Willamette River | | | | | | | | |
| A | 96,160 | 548/210[2] | 6,952 | 8.9 | 391.2 | 391.2 | 391.8 | 0.6 |
| B | 96,270 | 548/210[2] | 7,142 | 8.7 | 391.6 | 391.6 | 392.1 | 0.5 |
| C | 98,050 | 630 | 10,955 | 5.7 | 394.4 | 394.4 | 394.7 | 0.3 |
| D | 99,690 | 562/332[2] | 6,871 | 9.0 | 395.1 | 395.1 | 395.4 | 0.3 |
| E | 101,450 | 848/218[2] | 10,138 | 6.1 | 397.9 | 397.9 | 398.1 | 0.2 |
| F | 102,690 | 650[3] | 8,532 | 7.3 | 399.2 | 399.2 | 399.3 | 0.1 |
| G | 103,470 | 492/107[2] | 7,592 | 8.2 | 399.8 | 399.8 | 400.1 | 0.3 |
| H | 104,310 | 550/120[2] | 8,185 | 1.6 | 401.0 | 401.0 | 401.2 | 0.2 |
| I | 104,930 | 450/220[2] | 7,331 | 8.5 | 401.6 | 401.6 | 401.8 | 0.2 |
| J | 106,210 | 1,084/814[2] | 14,961 | 4.7 | 403.3 | 403.3 | 403.5 | 0.2 |
| K | 108,390 | 584 | 8,083 | 8.8 | 403.7 | 403.7 | 404.1 | 0.4 |
| L | 110,100 | 594 | 8,288 | 8.6 | 406.3 | 406.3 | 406.5 | 0.2 |
| M | 111,570 | 392 | 6,717 | 10.6 | 408.3 | 408.3 | 408.4 | 0.1 |
| N | 111,670 | 393 | 6,810 | 10.4 | 408.6 | 408.6 | 408.7 | 0.1 |
| O | 113,350 | 434 | 8,112 | 8.8 | 412.4 | 412.4 | 412.6 | 0.2 |
| P | 115,160 | 513 | 10,279 | 6.9 | 414.7 | 414.7 | 415.0 | 0.3 |
| Q | 116,530 | 335 | 8,194 | 8.7 | 415.7 | 415.7 | 416.1 | 0.4 |
| R | 116,610 | 335 | 8,227 | 8.6 | 415.8 | 415.8 | 416.2 | 0.4 |
| S | 117,770 | 727 | 14,852 | 4.8 | 417.5 | 417.5 | 418.0 | 0.5 |
| T | 119,150 | 871 | 13,926 | 5.1 | 417.7 | 417.7 | 418.5 | 0.8 |
| U | 121,480 | 587 | 8,885 | 8.0 | 419.5 | 419.5 | 420.3 | 0.8 |
| V | 123,250 | 575 | 9,010 | 7.9 | 422.7 | 422.7 | 423.1 | 0.4 |
| W | 124,250 | 875 | 9,486 | 7.5 | 424.3 | 424.3 | 424.5 | 0.2 |
| X | 126,030 | 800 | 9,290 | 7.6 | 426.1 | 426.1 | 426.7 | 0.6 |
| Y | 127,540 | 812 | 10,759 | 6.6 | 428.5 | 428.5 | 429.5 | 1.0 |

[1] Feet Above a Point Approximately 11,850 Feet Downstream of U.S. Highway 99E

[2] Width/Width Within Corporate Limits

[3] Floodway Lies Entirely Outside Corporate Limits

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**FLOODWAY DATA**

WILLAMETTE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | | (FEET NGVD) | | |
| Willamette River (Cont'd) | | | | | | | | |
| Z | 127,620[1] | 812/352[2] | 10,871 | 6.5 | 428.7 | 428.7 | 429.7 | 1.0 |
| AA | 129,020[1] | 503[3] | 8,080 | 8.8 | 430.7 | 430.7 | 431.4 | 0.7 |
| Dedrick Slough | | | | | | | | |
| A | 1,830[4] | 125 | 1,582 | 5.7 | 391.2 | 391.2 | 391.8 | 0.6 |
| B | 1,950[4] | 125 | 1,640 | 5.5 | 391.6 | 391.6 | 392.2 | 0.6 |
| C | 2,590[4] | 210 | 1,590 | 5.7 | 392.6 | 392.6 | 392.9 | 0.3 |
| D | 3,310[4] | 98 | 1,220 | 7.4 | 393.1 | 393.1 | 394.1 | 1.0 |
| E | 4,300[4] | 280 | 2,267 | 4.0 | 395.0 | 395.0 | 395.7 | 0.7 |
| F | 4,600[4] | 114 | 1,684 | 5.3 | 395.2 | 395.2 | 395.8 | 0.6 |
| G | 4,680[4] | 114 | 1,756 | 5.1 | 395.9 | 395.9 | 396.5 | 0.6 |
| H | 4,980[4] | 290 | 2,607 | 3.5 | 396.3 | 396.3 | 396.9 | 0.6 |
| I | 5,930[4] | 420 | 4,504 | 2.0 | 396.8 | 396.8 | 397.3 | 0.5 |
| J | 6,850[4] | 1,115 | 10,053 | 0.9 | 396.9 | 396.9 | 397.5 | 0.6 |
| K | 9,350[4] | 569 | 7,418 | 1.2 | 401.2 | 401.2 | 401.2 | 0.0 |

[1] Stream Distance in Feet Above a Point Approximately 11,850 Feet Downstream of U.S. Highway 99E

[2] Width/Width Within Corporate Limits [3] Floodway Lies Entirely Outside Corporate Limits

[4] Feet Above Willamette River

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**FLOODWAY DATA**

**WILLAMETTE RIVER-DEDRICK SLOUGH**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY (FEET NGVD) | WITH FLOODWAY | INCREASE |
| Amazon Creek | | | | | | | | |
| A | 67,577 | 107[2] | 821 | 5.8 | 384.4[3] | 382.6 | 383.6 | 1.0 |
| B | 67,612 | 107[2] | 824 | 5.8 | 384.4[3] | 382.7 | 383.7 | 1.0 |
| C | 67,880 | 351[2] | 1,643 | 2.9 | 384.4[3] | 383.6 | 384.3 | 0.7 |
| D | 68,080 | 757[2] | 2,276 | 2.1 | 384.4[3] | 383.7 | 384.4 | 0.7 |
| E | 69,617 | 85 | 642 | 5.3 | 384.4 | 384.3 | 385.2 | 0.9 |
| F | 70,917 | 87 | 699 | 4.9 | 385.7 | 385.7 | 386.6 | 0.9 |
| G[4] | 70,942 | 640 | 1,645 | 2.8 | 385.9 | 385.9 | 386.8 | 0.9 |
| H | 72,617 | 280/230[5] | 920 | 5.0 | 387.8 | 387.8 | 388.2 | 0.4 |
| I | 72,783 | 270/150[5] | 761 | 6.1 | 387.8 | 387.8 | 388.4 | 0.6 |
| J | 72,807 | 591/335[5] | 948 | 4.9 | 388.0 | 388.0 | 389.0 | 1.0 |
| K | 73,507 | 131 | 795 | 5.8 | 389.8 | 389.8 | 390.2 | 0.4 |
| L | 74,167 | 190 | 764 | 4.6 | 390.4 | 390.4 | 391.1 | 0.7 |
| M | 74,307 | 190 | 722 | 4.8 | 390.4 | 390.4 | 391.1 | 0.7 |
| N | 75,677 | 847 | 1,916 | 1.8 | 391.2 | 391.2 | 391.8 | 0.6 |
| O | 77,103 | 93 | 447 | 7.8 | 391.4 | 391.4 | 392.4 | 1.0 |
| P | 77,159 | 93 | 457 | 7.6 | 391.7 | 391.7 | 392.6 | 0.9 |
| Q | 77,659 | 121 | 585 | 6.0 | 393.5 | 393.5 | 393.7 | 0.2 |
| R | 78,159 | 168 | 602 | 5.8 | 393.7 | 393.7 | 394.3 | 0.6 |
| S | 78,259 | 142 | 646 | 5.4 | 394.6 | 394.6 | 394.8 | 0.2 |
| T | 79,787 | 115 | 607 | 5.4 | 395.1 | 395.1 | 396.0 | 0.9 |
| U | 81,323 | 70 | 497 | 5.6 | 396.4 | 396.4 | 397.3 | 0.9 |
| V | 81,379 | 71 | 534 | 5.2 | 396.9 | 396.9 | 397.8 | 0.9 |
| W | 82,654 | 70 | 518 | 5.4 | 398.4 | 398.4 | 398.9 | 0.5 |
| X | 83,929 | 69 | 485 | 5.8 | 399.5 | 399.5 | 400.2 | 0.7 |
| Y | 83,954 | 70 | 505 | 5.5 | 399.9 | 399.9 | 400.4 | 0.5 |
| Z | 84,452 | 70 | 497 | 5.6 | 400.4 | 400.4 | 401.0 | 0.6 |

[1] Feet Above Mouth [2] Floodway Lies Entirely Outside Corporate Limits [3] Elevations Reflect Ponding Out
[4] Combined Floodway Data for Amazon Creek and Amazon Creek Split-Flow [5] Width/Width Within Corporate Limits

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**FLOODWAY DATA**

AMAZON CREEK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Amazon Creek (Cont'd) | | | | | | | | |
| AA | 84,708 | 65 | 408 | 6.9 | 400.4 | 400.4 | 401.1 | 0.7 |
| AB | 84,938 | 65 | 416 | 6.7 | 401.1 | 401.1 | 401.6 | 0.5 |
| AC | 84,990 | 65 | 446 | 6.3 | 401.5 | 401.5 | 402.1 | 0.6 |
| AD | 86,054 | 66 | 461 | 5.7 | 403.3 | 403.3 | 403.5 | 0.2 |
| AE | 87,117 | 67 | 449 | 5.9 | 404.6 | 404.6 | 404.7 | 0.1 |
| AF | 87,175 | 67 | 442 | 6.0 | 404.6 | 404.6 | 404.7 | 0.1 |
| AG | 87,987 | 68 | 453 | 5.3 | 405.7 | 405.7 | 405.8 | 0.1 |
| AH | 88,717 | 67 | 453 | 5.1 | 406.5 | 406.5 | 406.6 | 0.1 |
| AI | 88,776 | 67 | 447 | 5.2 | 406.5 | 406.5 | 406.6 | 0.1 |
| AJ | 89,575 | 66 | 438 | 5.3 | 407.2 | 407.2 | 407.2 | 0.0 |
| AK | 90,436 | 67 | 441 | 5.2 | 408.1 | 408.1 | 408.1 | 0.0 |
| AL | 90,562 | 73 | 659 | 3.5 | 410.8 | 410.8 | 411.2 | 0.4 |
| AM | 91,237 | 69 | 530 | 3.2 | 411.1 | 411.1 | 411.5 | 0.4 |
| AN | 91,882 | 65 | 409 | 4.0 | 411.3 | 411.3 | 411.6 | 0.3 |
| AO | 91,922 | 49 | 301 | 5.5 | 411.3 | 411.3 | 411.6 | 0.3 |
| AP | 91,992 | 55 | 397 | 4.1 | 413.1 | 413.1 | 413.4 | 0.3 |
| AQ | 92,032 | 65 | 540 | 3.0 | 413.4 | 413.4 | 413.7 | 0.3 |
| AR | 92,052 | 72 | 541 | 2.9 | 413.4 | 413.4 | 413.7 | 0.3 |
| AS | 93,239 | 68 | 460 | 3.5 | 413.8 | 413.8 | 414.1 | 0.3 |
| AT | 93,909 | 65 | 419 | 3.8 | 414.1 | 414.1 | 414.3 | 0.2 |
| AU | 94,470 | 48 | 335 | 4.7 | 414.4 | 414.4 | 414.6 | 0.2 |
| AV | 94,495 | 48 | 336 | 4.7 | 414.4 | 414.4 | 414.6 | 0.2 |
| AW | 94,795 | 54 | 365 | 4.4 | 414.6 | 414.6 | 414.8 | 0.2 |
| AX | 94,945 | 32 | 221 | 4.2 | 414.6 | 414.6 | 414.8 | 0.2 |
| AY | 95,073 | 21 | 163 | 11.0 | 414.6 | 414.6 | 414.8 | 0.2 |
| AZ | 95,118 | 21 | 177 | 10.1 | 414.6 | 414.6 | 415.1 | 0.5 |

[1] Feet Above Mouth

| | | |
|---|---|---|
| TABLE 3 | FEDERAL EMERGENCY MANAGEMENT AGENCY<br>CITY OF EUGENE, OR<br>(LANE CO.) | FLOODWAY DATA<br>AMAZON CREEK |

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY (FEET NGVD) | WITH FLOODWAY (FEET NGVD) | INCREASE |
| Amazon Creek (Cont'd) | | | | | | | | |
| BA | 95,282 | 22 | 164 | 10.9 | 414.8 | 414.8 | 415.3 | 0.5 |
| BB | 95,446 | 122 | 253 | 7.1 | 415.8 | 415.8 | 416.5 | 0.7 |
| BC | 95,488 | 122 | 302 | 5.9 | 416.3 | 416.3 | 416.8 | 0.5 |
| BD | 95,653 | 31 | 221 | 8.1 | 416.5 | 416.5 | 416.9 | 0.4 |
| BE | 95,817 | 28 | 221 | 7.9 | 416.7 | 416.7 | 417.2 | 0.5 |
| BF | 95,863 | 31 | 240 | 7.3 | 417.3 | 417.3 | 417.8 | 0.5 |
| BG | 96,030 | 30 | 237 | 7.3 | 417.5 | 417.5 | 418.0 | 0.5 |
| BH | 96,197 | 30 | 236 | 7.4 | 417.6 | 417.6 | 418.2 | 0.6 |
| BI | 96,241 | 32 | 246 | 7.1 | 418.2 | 418.2 | 418.6 | 0.4 |
| BJ | 96,423 | 29 | 245 | 7.1 | 418.3 | 418.3 | 418.7 | 0.4 |
| BK | 96,604 | 29 | 244 | 7.1 | 418.5 | 418.5 | 419.0 | 0.5 |
| BL | 96,648 | 31 | 260 | 6.7 | 418.9 | 418.9 | 419.5 | 0.6 |
| BM | 96,711 | 30 | 258 | 6.8 | 418.9 | 418.9 | 419.5 | 0.6 |
| BN | 96,774 | 30 | 257 | 6.6 | 419.0 | 419.0 | 419.6 | 0.6 |
| BO | 96,816 | 31 | 267 | 6.3 | 419.4 | 419.4 | 420.0 | 0.6 |
| BP | 96,929 | 31 | 264 | 6.4 | 419.5 | 419.5 | 420.1 | 0.6 |
| BQ | 97,041 | 122 | 307 | 5.5 | 419.5 | 419.5 | 420.1 | 0.6 |
| BR | 97,091 | 122 | 348 | 4.9 | 419.9 | 419.9 | 420.5 | 0.6 |
| BS | 97,279 | 122 | 317 | 5.3 | 420.0 | 420.0 | 420.5 | 0.5 |
| BT | 97,467 | 122 | 316 | 5.4 | 420.1 | 420.1 | 420.6 | 0.5 |
| BU | 97,585 | 122 | 357 | 4.7 | 420.6 | 420.6 | 421.1 | 0.5 |
| BV | 97,799 | 122 | 367 | 4.6 | 420.7 | 420.7 | 421.2 | 0.5 |
| BW | 98,013 | 122 | 440 | 3.8 | 420.9 | 420.9 | 421.4 | 0.5 |
| BX | 98,065 | 122 | 411 | 4.1 | 420.9 | 420.9 | 421.4 | 0.5 |
| BY | 98,250 | 122 | 426 | 3.9 | 421.0 | 421.0 | 421.5 | 0.5 |
| BZ | 98,434 | 122 | 482 | 3.5 | 421.2 | 421.2 | 421.7 | 0.5 |

[1] Feet Above Mouth

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**FLOODWAY DATA**

AMAZON CREEK

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| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Amazon Creek (Cont'd) | | | | | | | | |
| CA | 98,502 | 122 | 457 | 3.7 | 421.3 | 421.3 | 421.7 | 0.4 |
| CB | 98,704 | 122 | 392 | 4.3 | 421.4 | 421.4 | 421.8 | 0.4 |
| CC | 98,906 | 122 | 380 | 4.4 | 421.5 | 421.5 | 421.9 | 0.4 |
| CD | 98,962 | 122 | 349 | 4.8 | 421.7 | 421.7 | 422.0 | 0.3 |
| CE | 99,133 | 122 | 419 | 4.0 | 421.9 | 421.9 | 422.3 | 0.4 |
| CF | 99,305 | 122 | 474 | 3.3 | 422.1 | 422.1 | 422.5 | 0.4 |
| CG | 99,360 | 120 | 459 | 3.4 | 422.2 | 422.2 | 422.6 | 0.4 |
| CH | 99,460 | 120 | 424 | 3.7 | 422.2 | 422.2 | 422.6 | 0.4 |
| CI | 100,397 | 41 | 225 | 7.0 | 422.5 | 422.5 | 422.9 | 0.4 |
| CJ | 101,335 | 48 | 171 | 9.2 | 423.3 | 423.3 | 423.9 | 0.6 |
| CK | 101,381 | 64 | 258 | 6.1 | 424.9 | 424.9 | 425.5 | 0.6 |
| CL | 101,424 | 47 | 262 | 6.0 | 425.7 | 425.7 | 426.1 | 0.4 |
| CM | 101,686 | 47 | 263 | 6.0 | 426.1 | 426.1 | 426.4 | 0.3 |
| CN | 101,786 | 95 | 533 | 3.0 | 426.7 | 426.7 | 426.9 | 0.2 |
| CO | 103,069 | 87 | 449 | 2.9 | 427.4 | 427.4 | 427.5 | 0.1 |
| CP | 104,340 | 75 | 329 | 3.4 | 428.3 | 428.3 | 428.4 | 0.1 |
| CQ | 104,508 | 54 | 336 | 3.4 | 434.6 | 434.6 | 434.6 | 0.0 |
| CR | 104,832 | 51 | 299 | 3.8 | 434.8 | 434.8 | 434.8 | 0.0 |
| CS | 105,169 | 49 | 271 | 4.2 | 435.1 | 435.1 | 435.1 | 0.0 |
| CT | 105,221 | 49 | 268 | 4.2 | 435.1 | 435.1 | 435.1 | 0.0 |
| CU | 105,393 | 48 | 255 | 4.2 | 435.3 | 435.3 | 435.3 | 0.0 |
| CV | 105,516 | 48 | 252 | 4.3 | 435.4 | 435.4 | 435.4 | 0.0 |
| CW | 105,683 | 54 | 338 | 3.2 | 437.6 | 437.6 | 437.6 | 0.0 |
| CX | 105,978 | 52 | 304 | 3.6 | 437.8 | 437.8 | 437.8 | 0.0 |
| CY | 106,273 | 50 | 279 | 3.9 | 438.0 | 438.0 | 438.0 | 0.0 |
| CZ | 106,573 | 92 | 331 | 3.3 | 441.2 | 441.2 | 441.2 | 0.0 |

[1] Feet Above Mouth

| | | |
|---|---|---|
| TABLE 3 | FEDERAL EMERGENCY MANAGEMENT AGENCY<br>CITY OF EUGENE, OR<br>(LANE CO.) | **FLOODWAY DATA**<br>AMAZON CREEK |

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| | | | | | (FEET NGVD) | | | |
| Amazon Creek (Cont'd) | | | | | | | | |
| DA | 106,743 | 83 | 280 | 3.4 | 441.3 | 441.3 | 441.3 | 0.0 |
| DB | 108,533 | 32 | 115 | 6.8 | 445.5 | 445.5 | 445.5 | 0.0 |
| DC | 110,413 | 30 | 120 | 6.5 | 454.4 | 454.4 | 454.4 | 0.0 |
| DD | 110,743 | 107 | 254 | 1.7 | 458.5 | 458.5 | 458.5 | 0.0 |
| DE | 111,880 | 20 | 49 | 8.8 | 461.4 | 461.4 | 461.4 | 0.0 |
| DF | 113,017 | 28 | 65 | 4.5 | 470.6 | 470.6 | 470.6 | 0.0 |
| DG | 113,257 | 65 | 218 | 1.3 | 474.8 | 474.8 | 474.8 | 0.0 |
| DH | 114,365 | 21 | 38 | 7.7 | 478.7 | 478.7 | 478.7 | 0.0 |
| DI | 115,507 | 8 | 27 | 10.7 | 518.3 | 518.3 | 518.3 | 0.0 |
| DJ | 115,547 | 28 | 67 | 4.3 | 521.1 | 521.1 | 521.1 | 0.0 |

[1] Feet Above Mouth

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**FLOODWAY DATA**

AMAZON CREEK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER SURFACE ELEVATION | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY (FEET NGVD) | WITH FLOODWAY (FEET NGVD) | INCREASE |
| Channel A3 | | | | | | | | |
| A | 11,734 | | | | 390.1 | | | |
| B | 11,868 | | | | 391.7 | | | |
| C | 11,878 | | | | 391.9 | | | |
| D | 11,934 | | | | 392.0 | | | |
| E | 12,934 | | | | 392.0 | | | |
| F | 13,409 | | | | 392.0 | | | |
| G | 14,144 | | | | 392.4 | | | |
| H | 14,244 | | | | 392.4 | | | |
| I | 14,269 | | | | 392.4 | | | |
| J | 15,214 | | | | 393.0 | | | |
| K | 16,214 | | | | 393.5 | | | |
| L | 17,214 | | | | 394.0 | | | |
| M | 17,784 | | | | 394.3 | | | |
| Amazon Creek Split-Flow | | | | | | | | |
| A | 825 | 190 | 671 | 1.8 | 384.4[2] | 384.3 | 385.3 | 1.0 |
| B | 2,050 | 236 | 594 | 2.1 | 385.9 | 385.9 | 368.8 | 0.9 |
| G[3] | 2,100 | 640 | 1,645 | 2.8 | 385.9 | 385.9 | 386.8 | 0.9 |

[1] Feet Above Amazon Creek

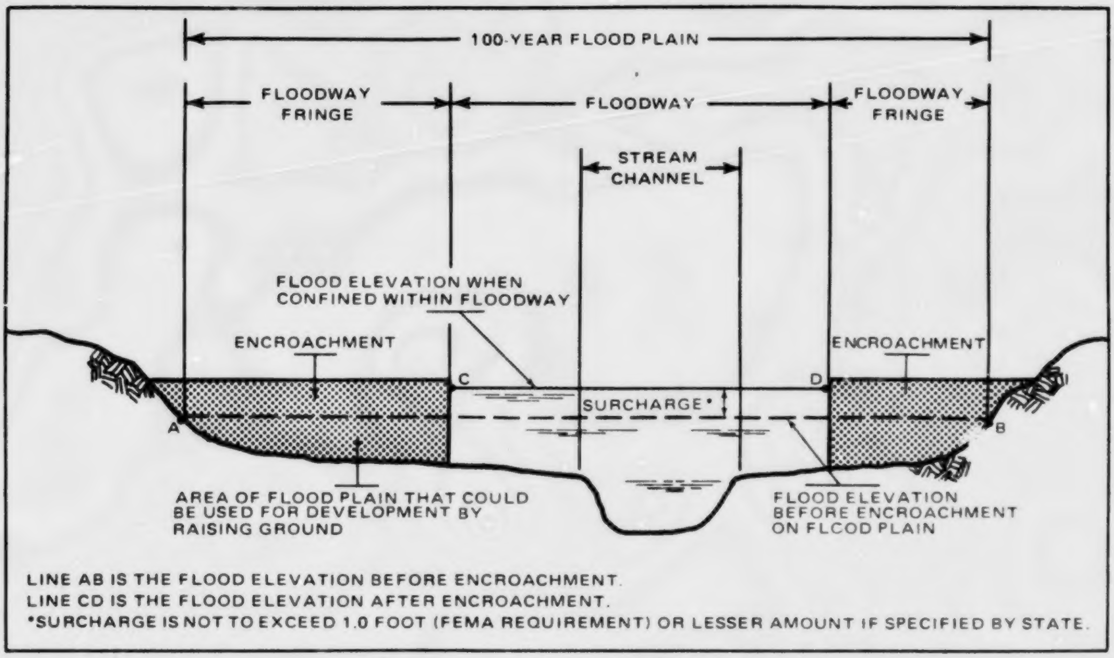
**TABLE 3**

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**FLOODWAY DATA**

CHANNEL A3–AMAZON CREEK SPLIT-FLOW


100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN

LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

Figure 2. Floodway Schematic

## 5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the City of Eugene.

### 5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

| Average Difference Between 10- and 100-Year Floods | Variation |
|---|---|
| Less than 2 feet | 0.5 foot |
| 2 to 7 feet | 1.0 foot |
| 7.1 to 12 feet | 2.0 feet |
| More than 12 feet | 3.0 feet |

The locations of the reaches determined for the flooding sources of Eugene are shown on the Flood Profiles (Exhibit 1) and summarized in Table 4.

For the portion of Channel A3 designated "Zone A Contained in Channel," no reach determinations were made.

## 5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest one-half foot, multiplied by 10, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10-and 100-year flood water-surface elevations is greater than 10.0 feet, it is rounded to the nearest whole foot.

FHFs are derived from standard reach determinations; therefore, they do not apply to the position of Channel A3 designated "Zone A Contained in Channel."

## 5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF, and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

| | |
|---|---|
| Zone A: | Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined. |
| Zone A0: | Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths are shown, but no FHFs are determined. |
| Zones A2-A7 and A9: | Special Flood Hazard Areas inundated by the 100-year flood; with base flood elevations shown, and zones subdivided according to FHFs. |

| FLOODING SOURCE | PANEL[1] | ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND | | | FLOOD HAZARD FACTOR | ZONE | BASE FLOOD ELEVATION (FEET NGVD)[3] |
|---|---|---|---|---|---|---|---|
| | | 10% (10-YEAR) | 2% (50-YEAR) | 0.2% (500-YEAR) | | | |
| **Willamette River** | | | | | | | |
| Reach 1 | 0002,0003 | -2.4 | -0.9 | 1.6 | 025 | A5 | Varies - See Map |
| Reach 2 | 0002,0005,<br>0006 | -4.5 | -1.5 | 3.8 | 045 | A9 | Varies - See Map |
| **Dedrick Slough** | | | | | | | |
| Reach 1 | 0002 | -2.4 | -0.9 | 1.5 | 025 | A5 | Varies - See Map |
| Reach 2 | 0002 | -4.3 | -1.4 | 3.6 | 045 | A9 | Varies - See Map |
| **Amazon Creek** [4] | | | | | | | |
| Reach 1 | 0004,0005 | -1.1 | -0.3 | | 010 | A2 | Varies - See Map |
| Reach 2 | 0005 | -2.2 | -1.1 | | 020 | A4 | Varies - See Map |
| Reach 3 | 0005 | -1.4 | -0.4 | | 015 | A3 | Varies - See Map |
| Reach 4 | 0005,0006,<br>0009 | -2.7 | -0.5 | | 025 | A5 | Varies - See Map |
| Reach 5 | 0009 | -2.0 | -0.6 | | 020 | A4 | Varies - See Map |
| Reach 6 | 0009 | -2.8 | -1.1 | | 030 | A6 | Varies - See Map |
| Reach 7 | 0009,0010 | -1.1 | -0.3 | | 010 | A2 | Varies - See Map |
| Shallow Flooding | 0005 | | | | | A0 | Depth 1 |
| **Channel A3** | | | | | | | |
| Reach 1 | 0004,0005 | -2.5 | -0.6 | 0.7 | 025 | A7 | Varies - See Map |
| Reach 2 | 0005 | -1.6 | -0.4 | 1.7 | 015 | A3 | Varies - See Map |
| **McKenzie River** | | | | | | | |
| Reach 1 | 0003 | -3.0 | -1.0 | 2.6 | 030 | A6 | Varies - See Map |
| **Amazon Creek Split-Flow** | | | | | | | |
| Reach 1 | 0004 | -1.5[5] | ---[4] | ---[4] | 015 | A3 | Varies - See Map |

[1] Flood Insurance Rate Map Panel [2] Weighted Average [3] Rounded to Nearest Foot

[4] Elevation Not Calculated [5] Based on Average Depth of Flood Plain

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

## FLOOD INSURANCE ZONE DATA

WILLAMETTE RIVER—DEDRICK SLOUGH—AMAZON CREEK
CHANNEL A3—MCKENZIE RIVER—AMAZON CREEK SPLIT-FLOW

| | |
|---|---|
| Zone B: | Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- or 500-year floods by dike, levee, or other local water-control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided. |
| Zone C: | Areas of minimal flood hazard; not subdivided. |

In this study, the channel studied by detailed methods in which the flood hazard is contained in the channel has been designated as "Zone A contained in Channel."

Flooding from the McKenzie River that affects Eugene is 500-year flooding only.

The flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 4.

### 5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Eugene is, for insurance purposes, the principal product of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevations. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the NFIP.

## 6.0 OTHER STUDIES

Flood Insurance Studies have been published for the City of Springfield (Reference 20) and the unincorporated areas of Lane County (Reference 21). This study is in agreement with those studies.

Other flood hazard studies that do not agree exactly with this study include an earlier Flood Insurance Study for Eugene (Reference 22); Water Surface Profiles, Willamette River and Tributaries, Oregon (Reference 5); and Flood Plain Information, Lane County (Reference 23). The reason for differences is the method of analysis. This study used a detailed computer analysis, whereas the other studies used less precise, approximate methods. Also, in some cases, the discharge for each flood frequency has been updated in this study.

A Flood Hazard Boundary Map has been published for the City of Eugene (Reference 24). This study uses more precise methods; therefore, it supersedes the information on that map.

## 7.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Federal Regional Center, 130 228th Street, SW., Bothell, Washington 98021-9796.

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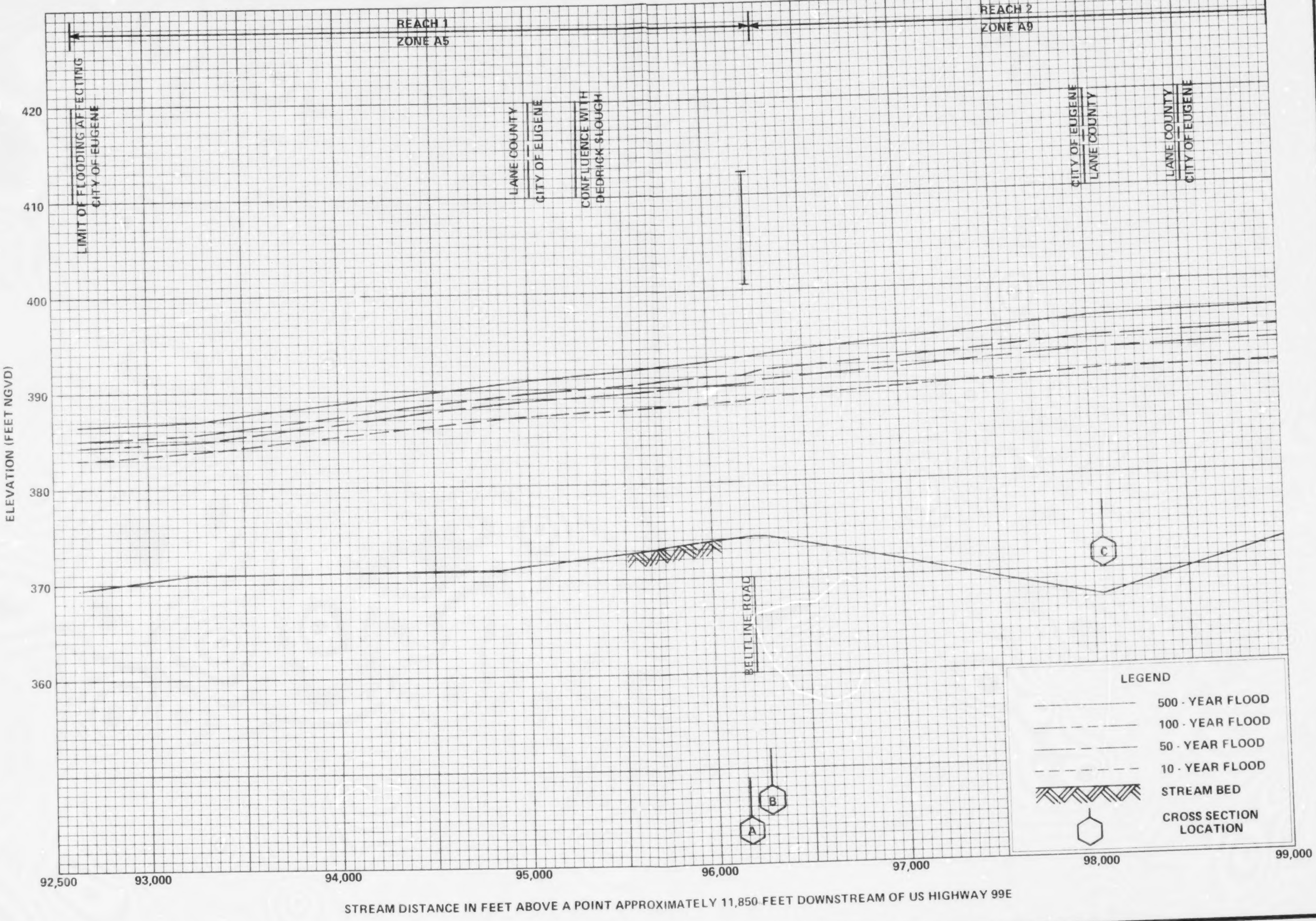


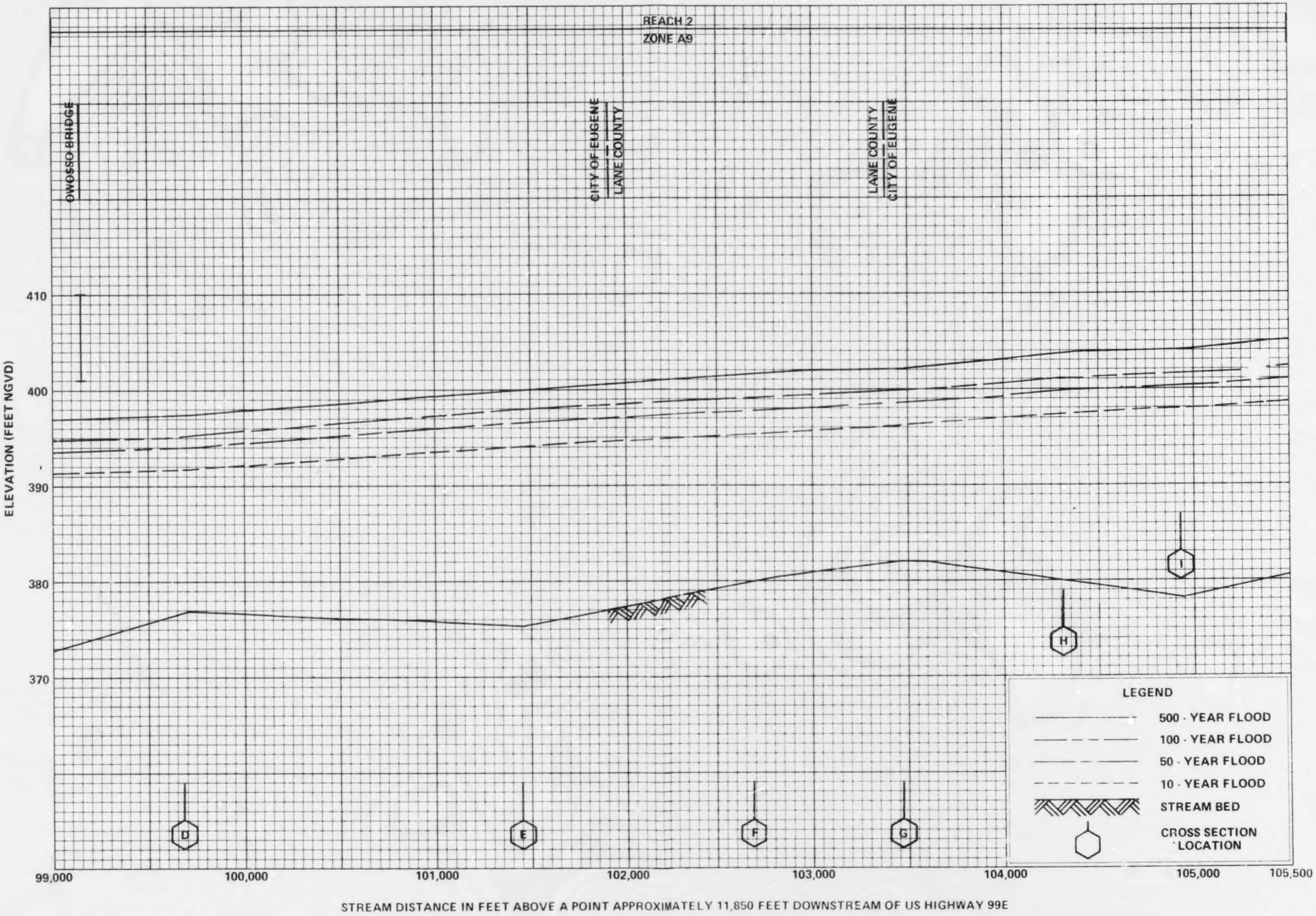
**FLOOD PROFILES**

WILLAMETTE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**01P**



## FLOOD PROFILES

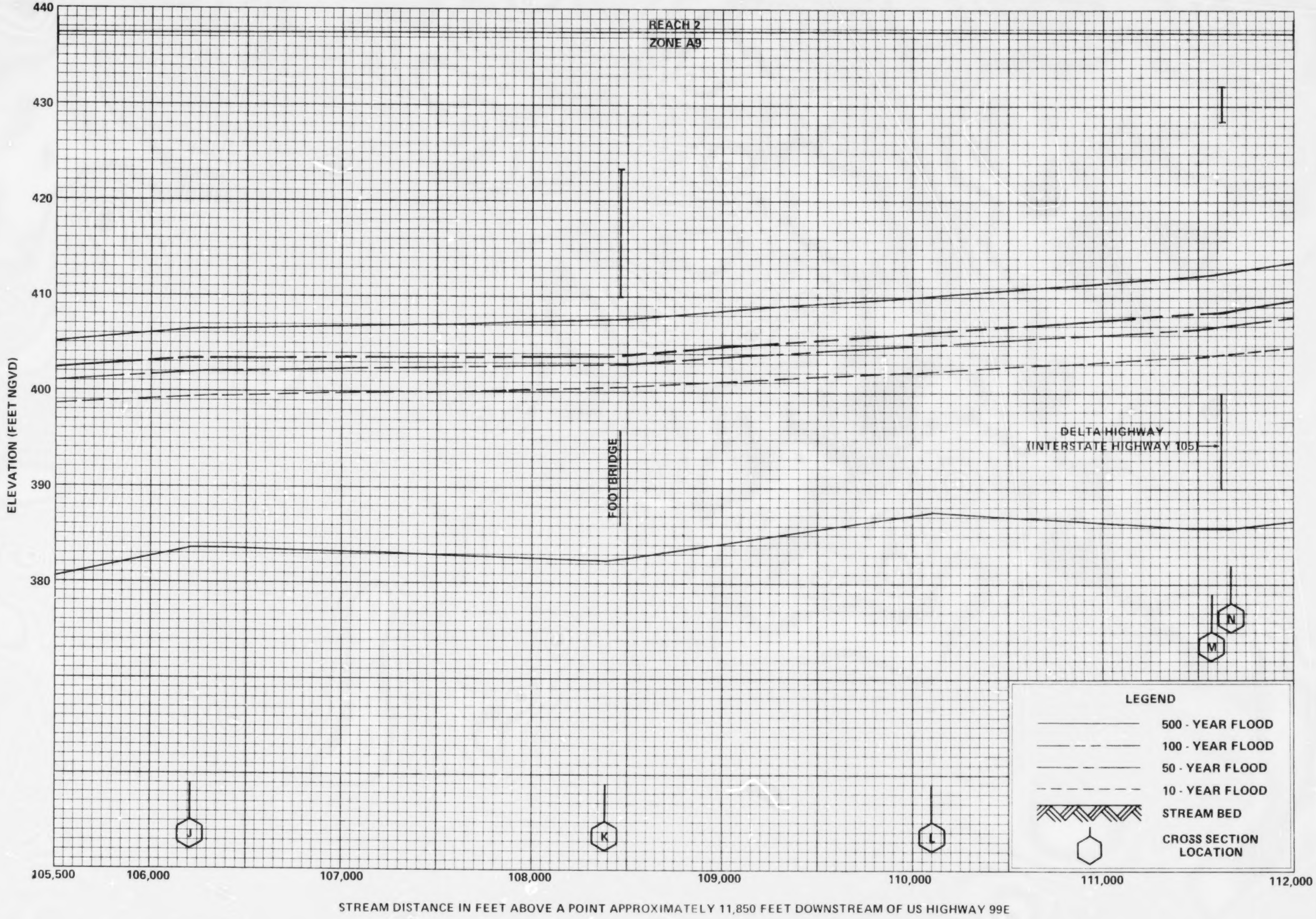
WILLAMETTE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**02P**

29



**FLOOD PROFILES**

WILLAMETTE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

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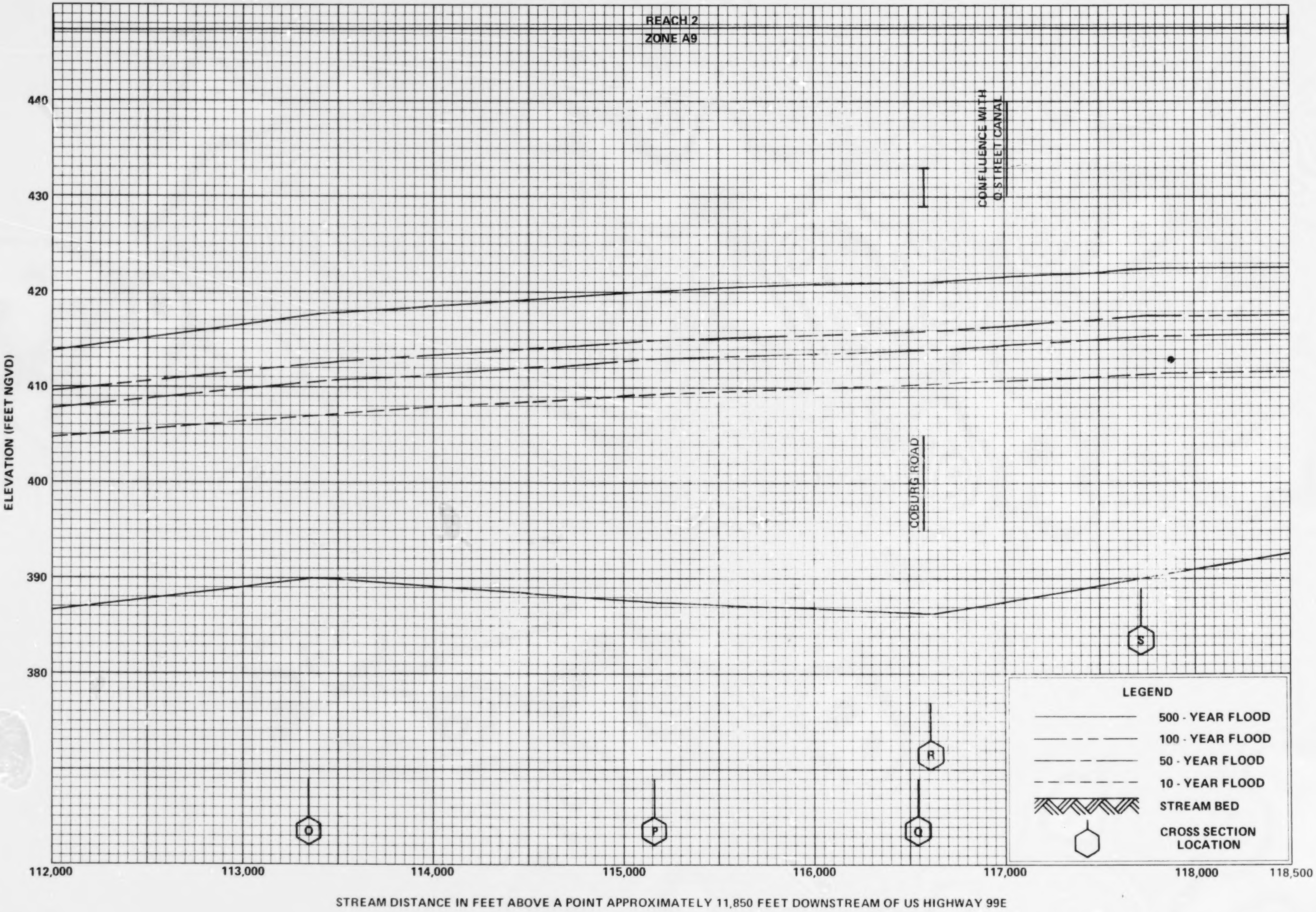


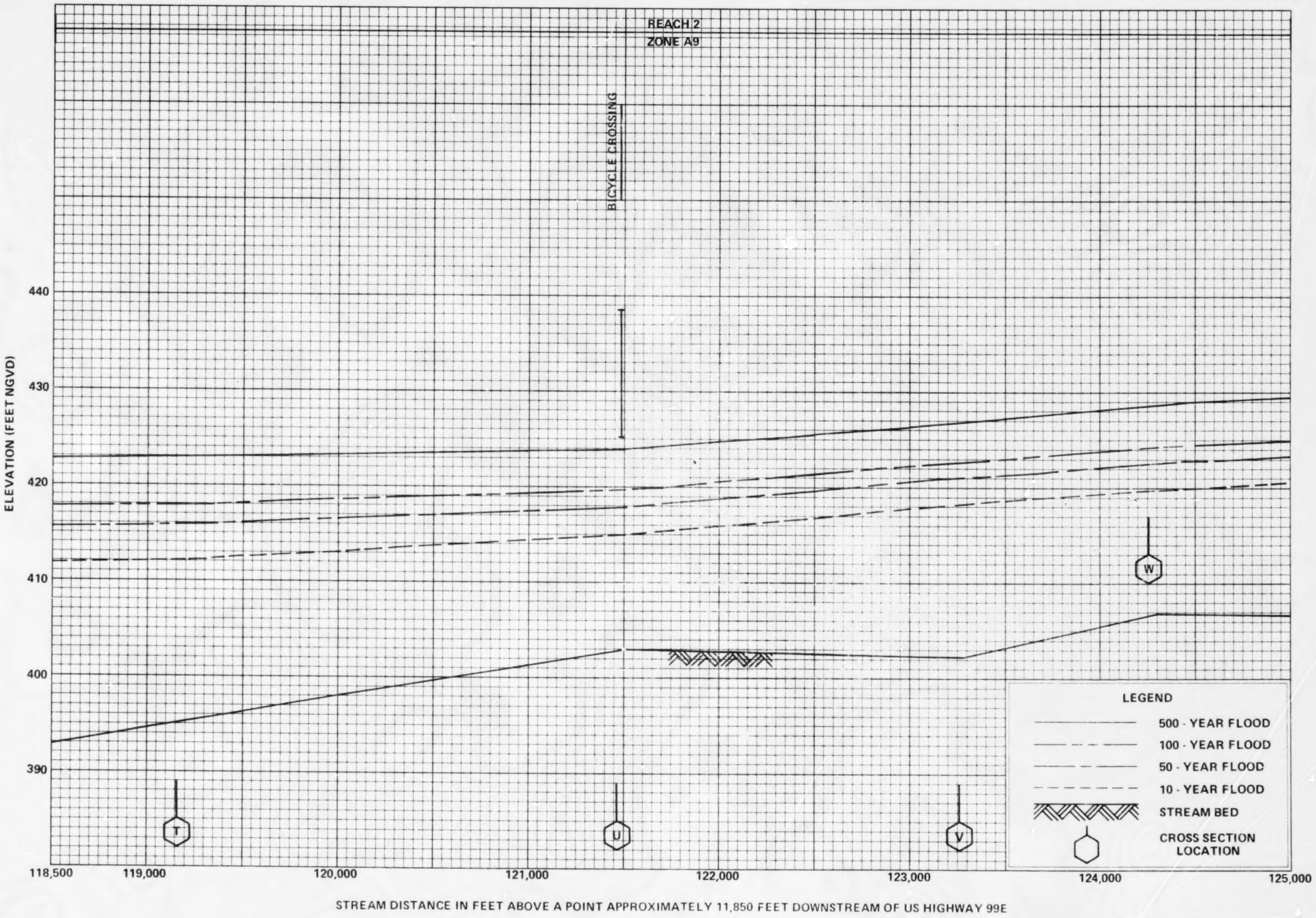
**FLOOD PROFILES**

WILLAMETTE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**04P**



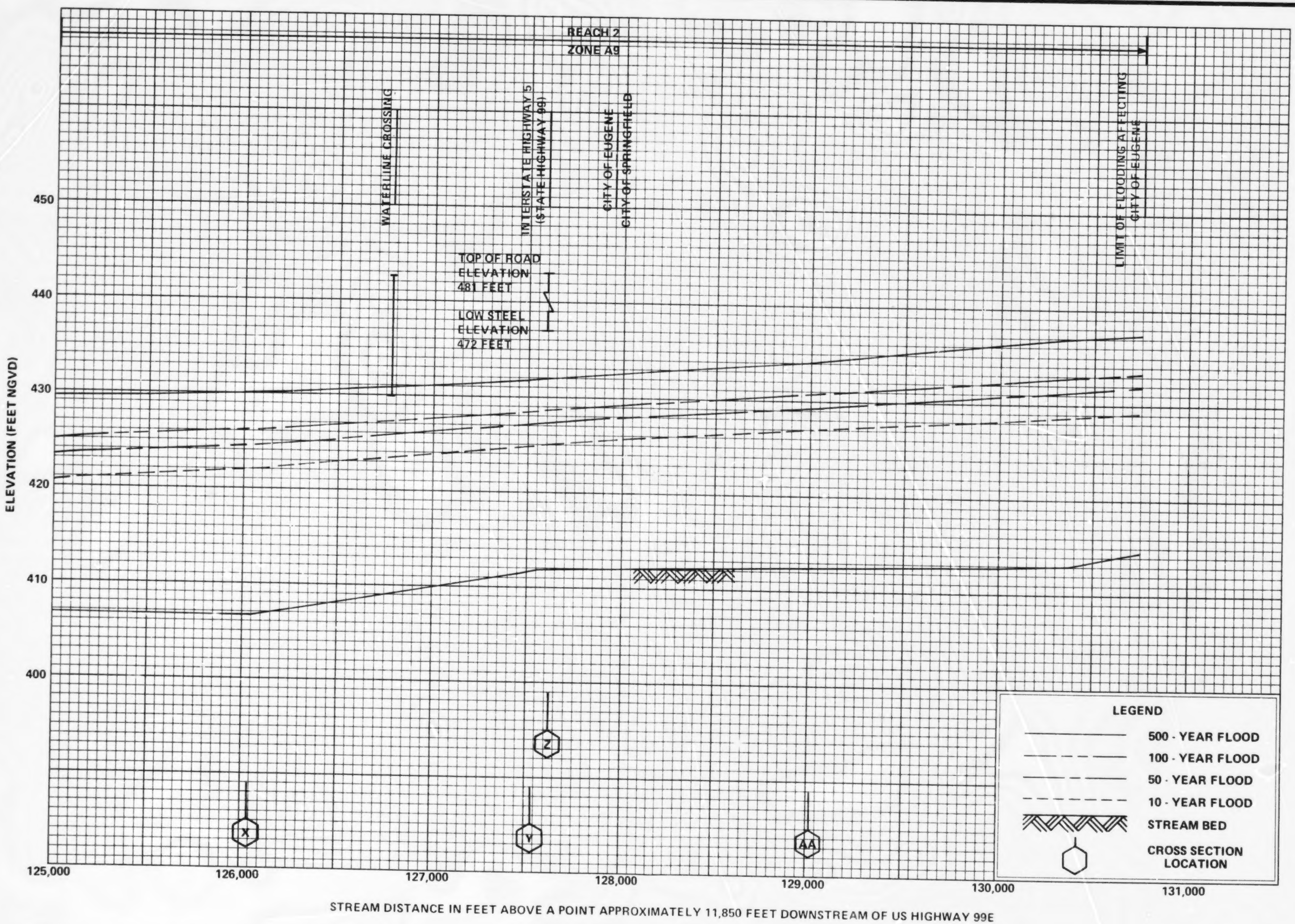
**FLOOD PROFILES**

WILLAMETTE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**05P**



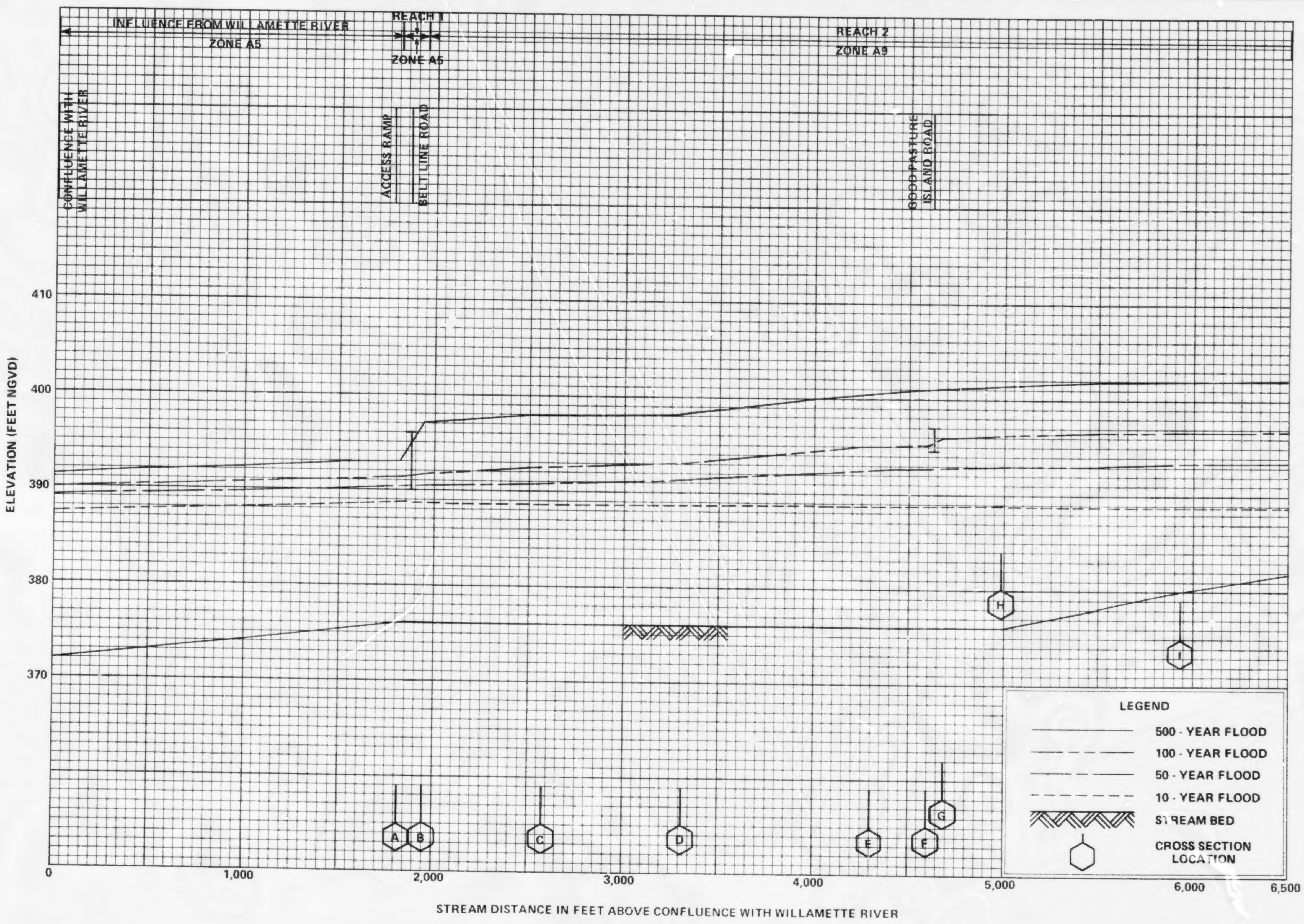
## FLOOD PROFILES

WILLAMETTE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

06P



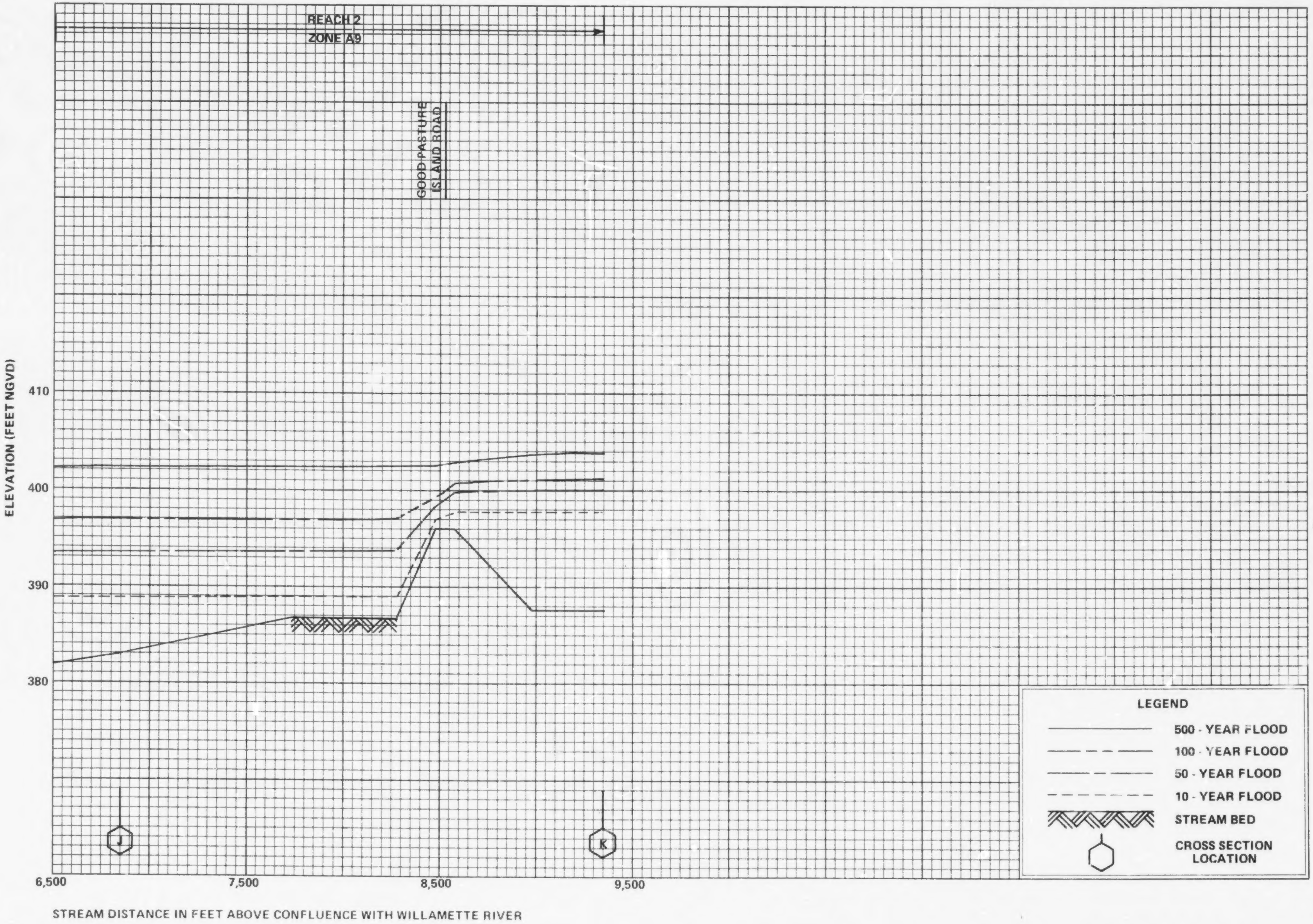
## FLOOD PROFILES

DEDRICK SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

07P



**FLOOD PROFILES**

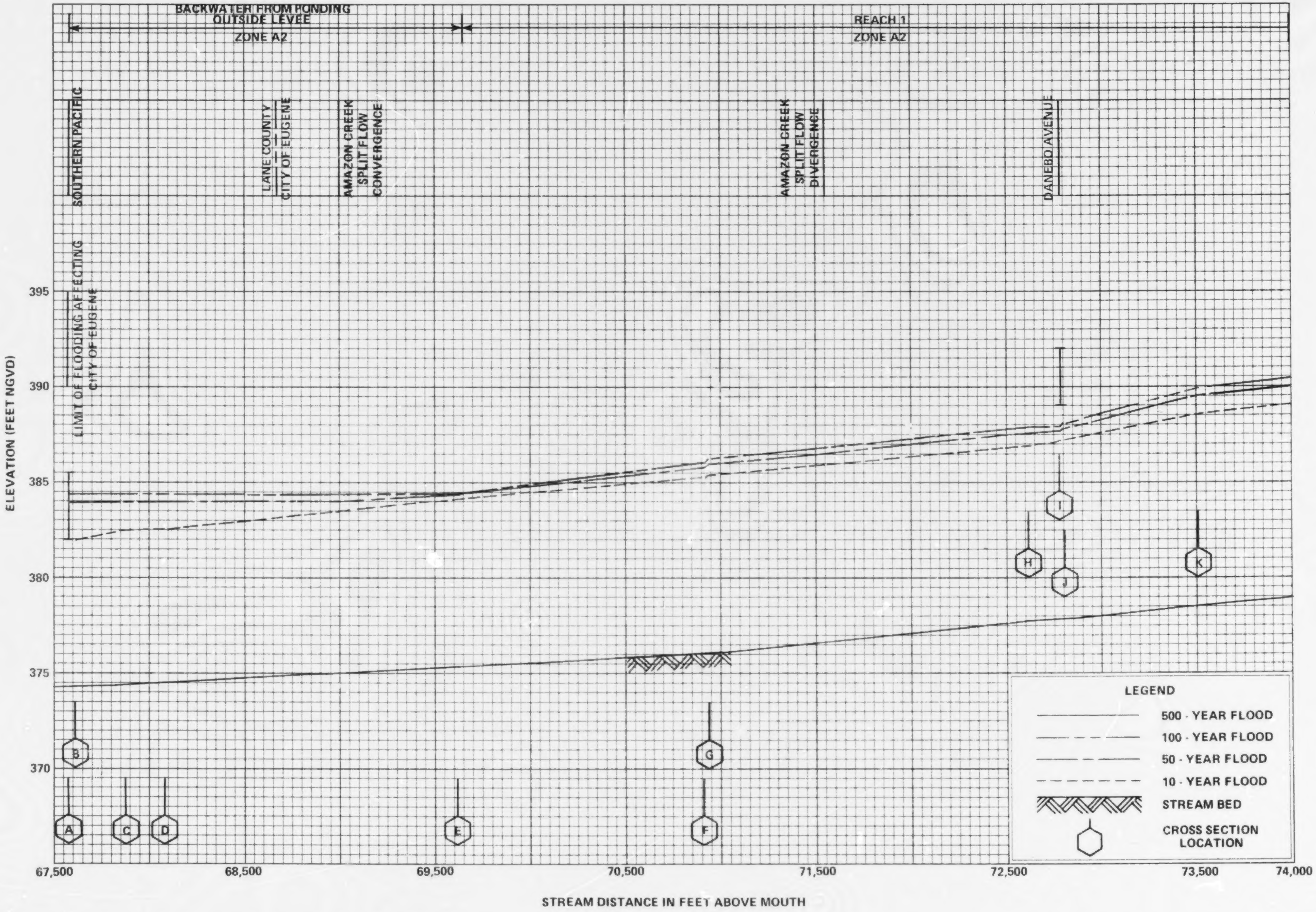
DEDRICK SLOUGH

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

CITY OF EUGENE, OR
(LANE CO.)

**08P**

35



**FLOOD PROFILES**

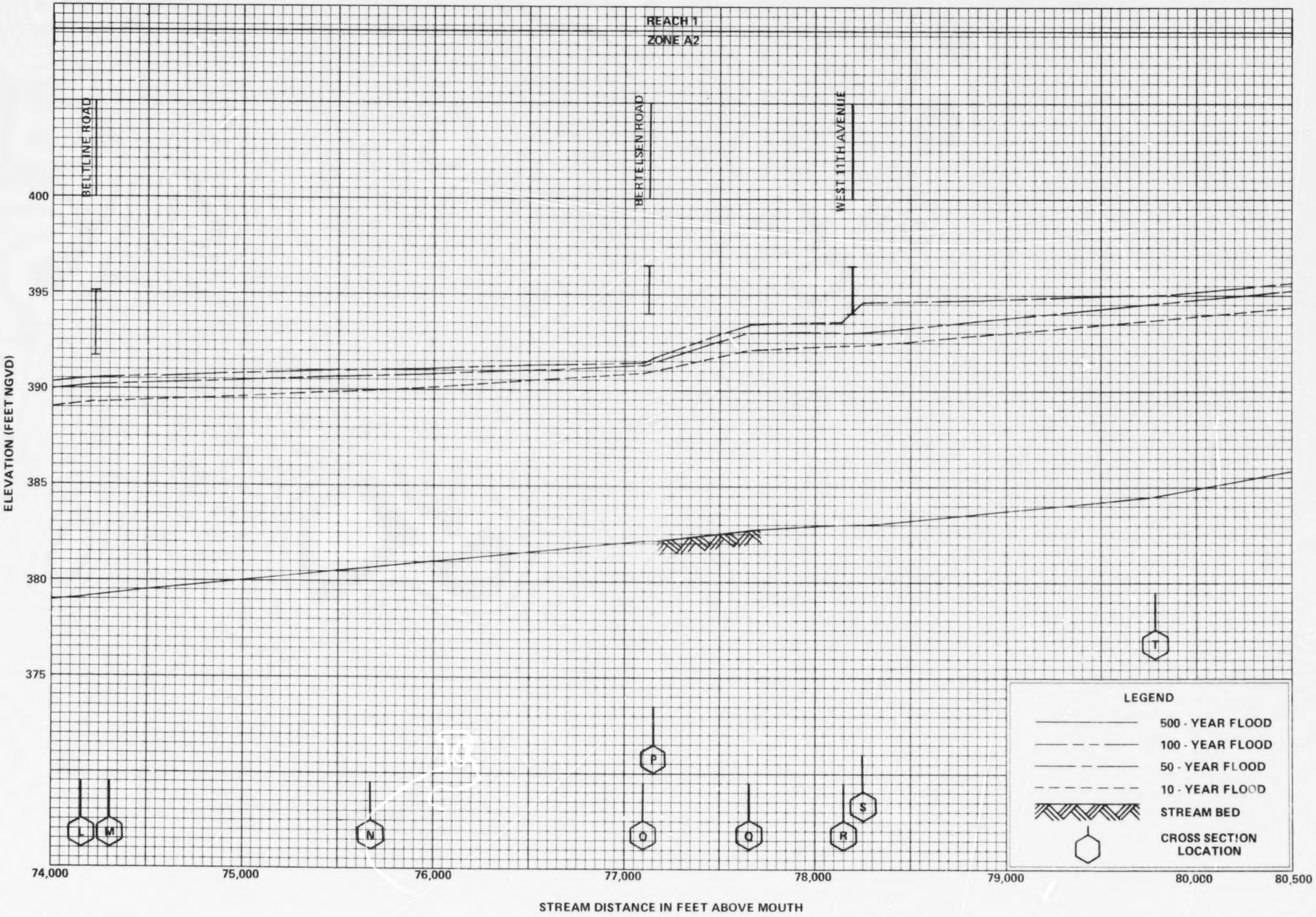
AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**09P**

36



## FLOOD PROFILES

AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

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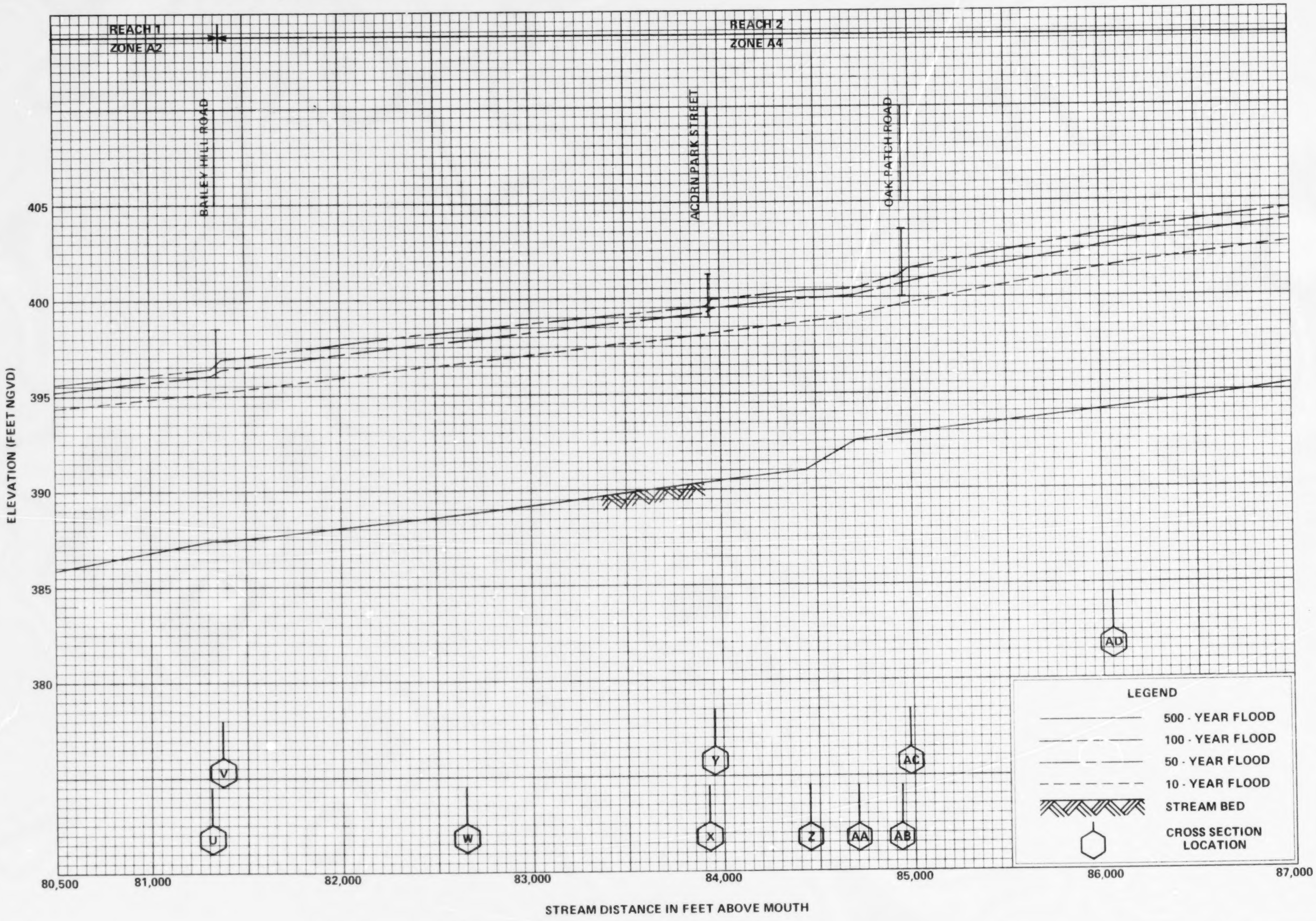


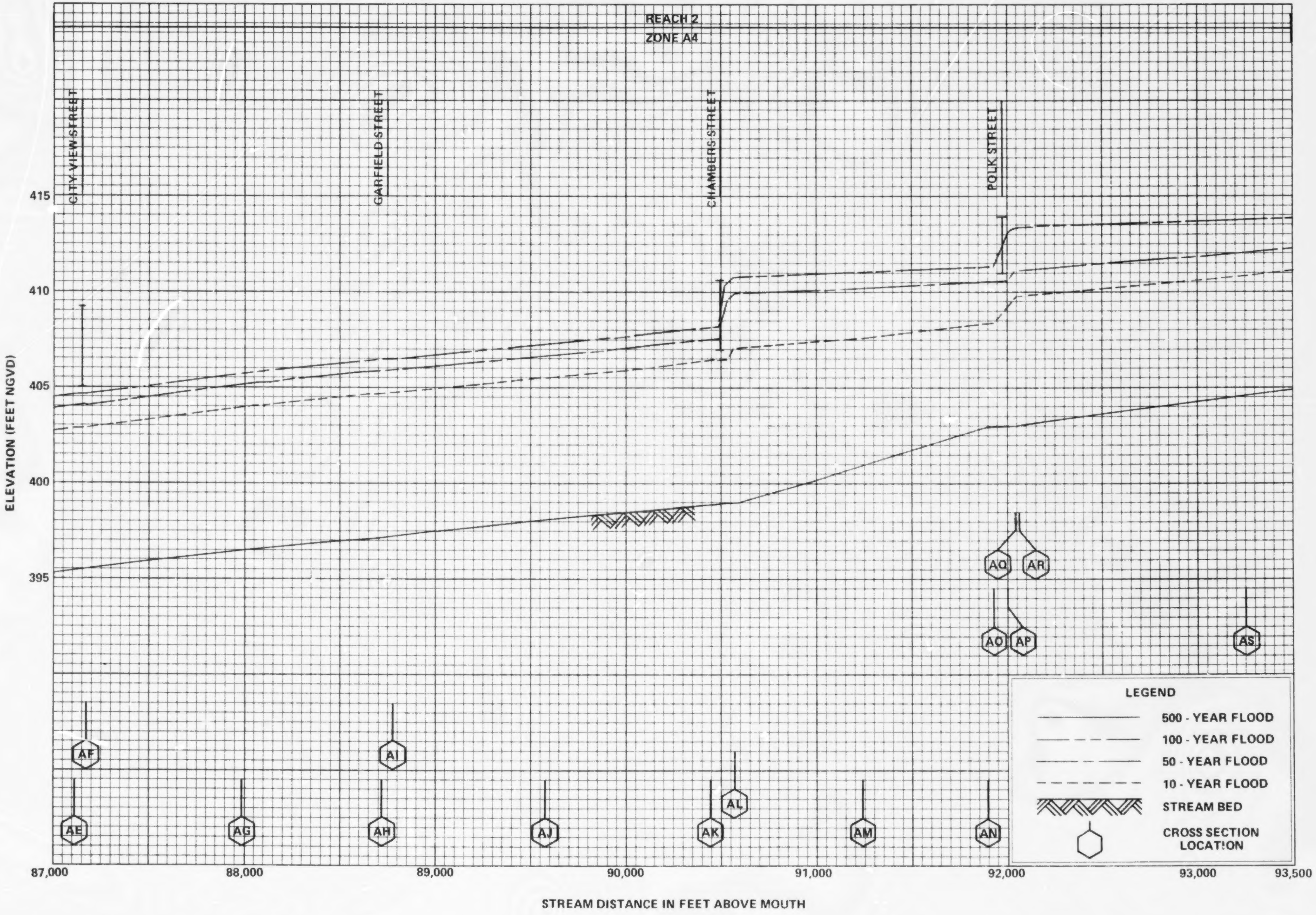
**FLOOD PROFILES**

AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**11P**



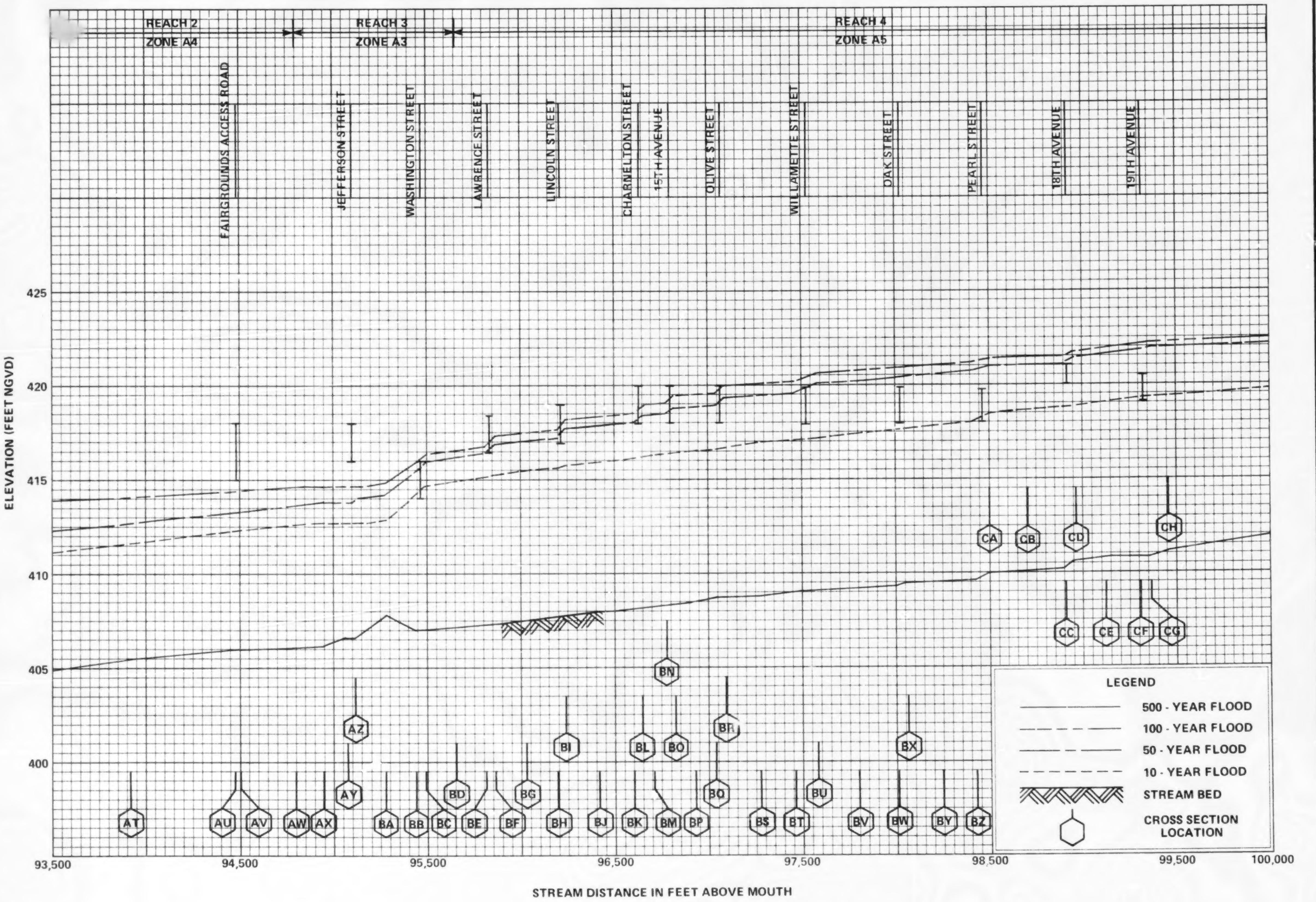
# FLOOD PROFILES

AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

12P



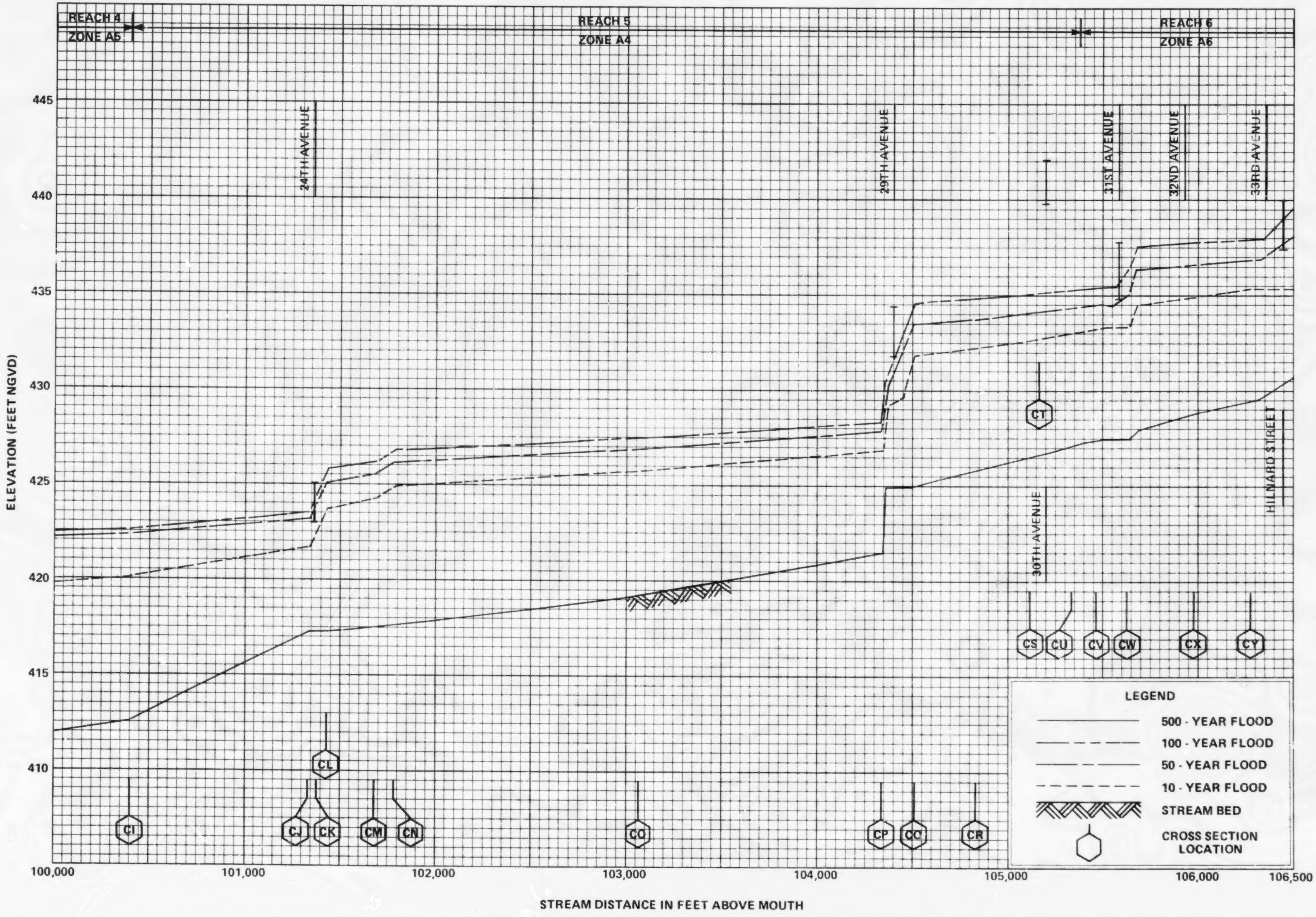
**FLOOD PROFILES**

AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**13P**



# FLOOD PROFILES

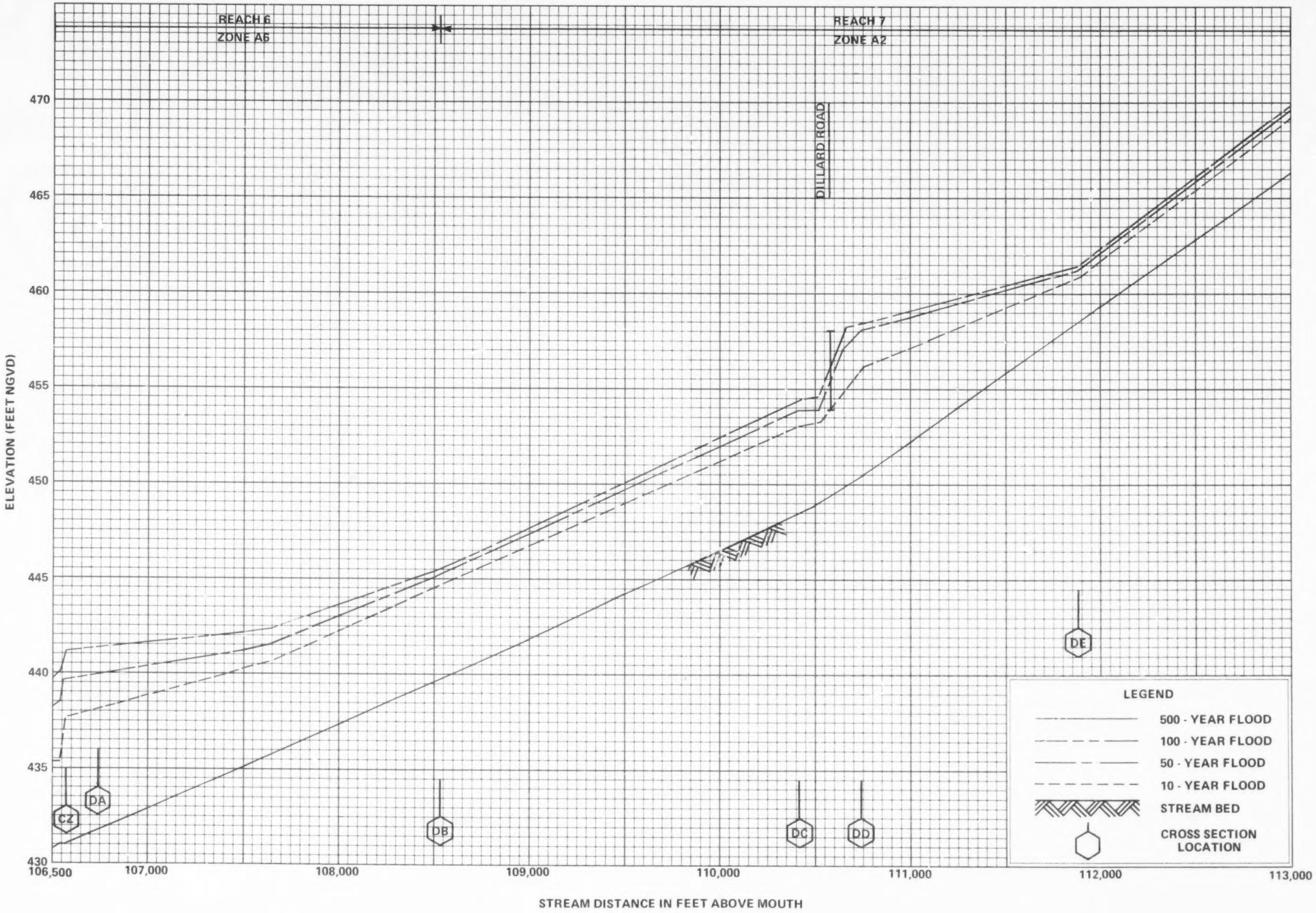
AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

14P

41

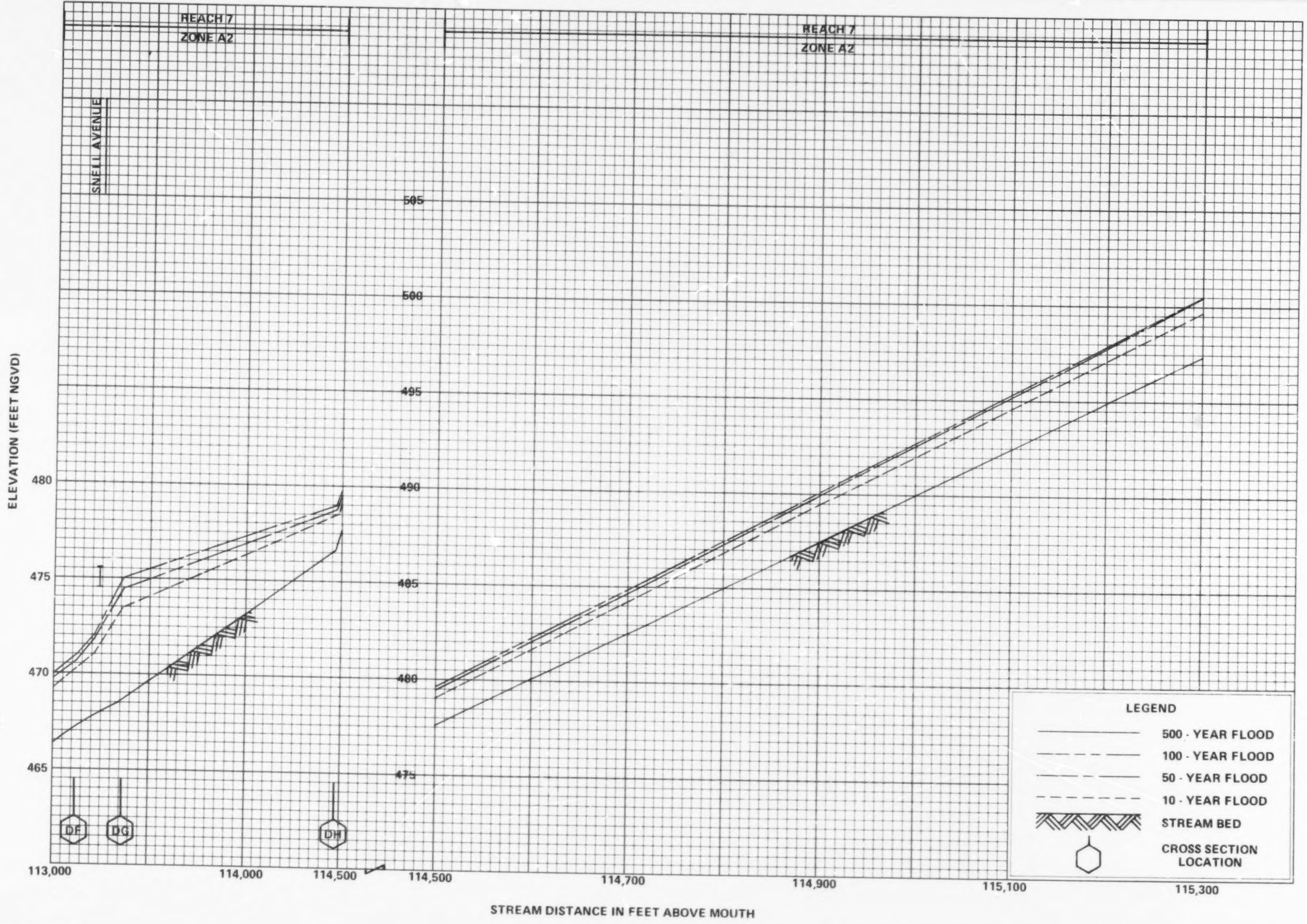


**FLOOD PROFILES**

AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)



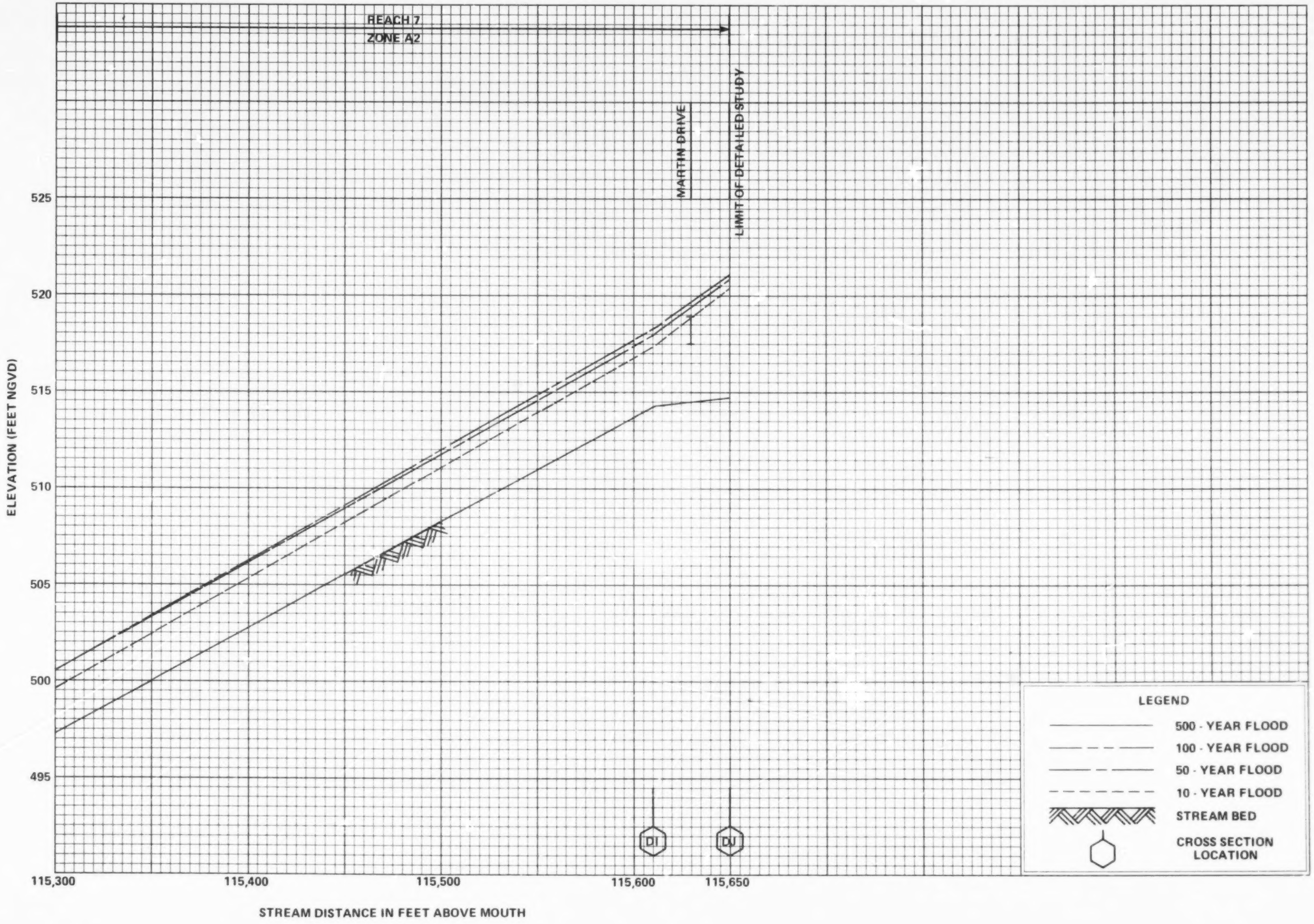
# FLOOD PROFILES

AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

16P



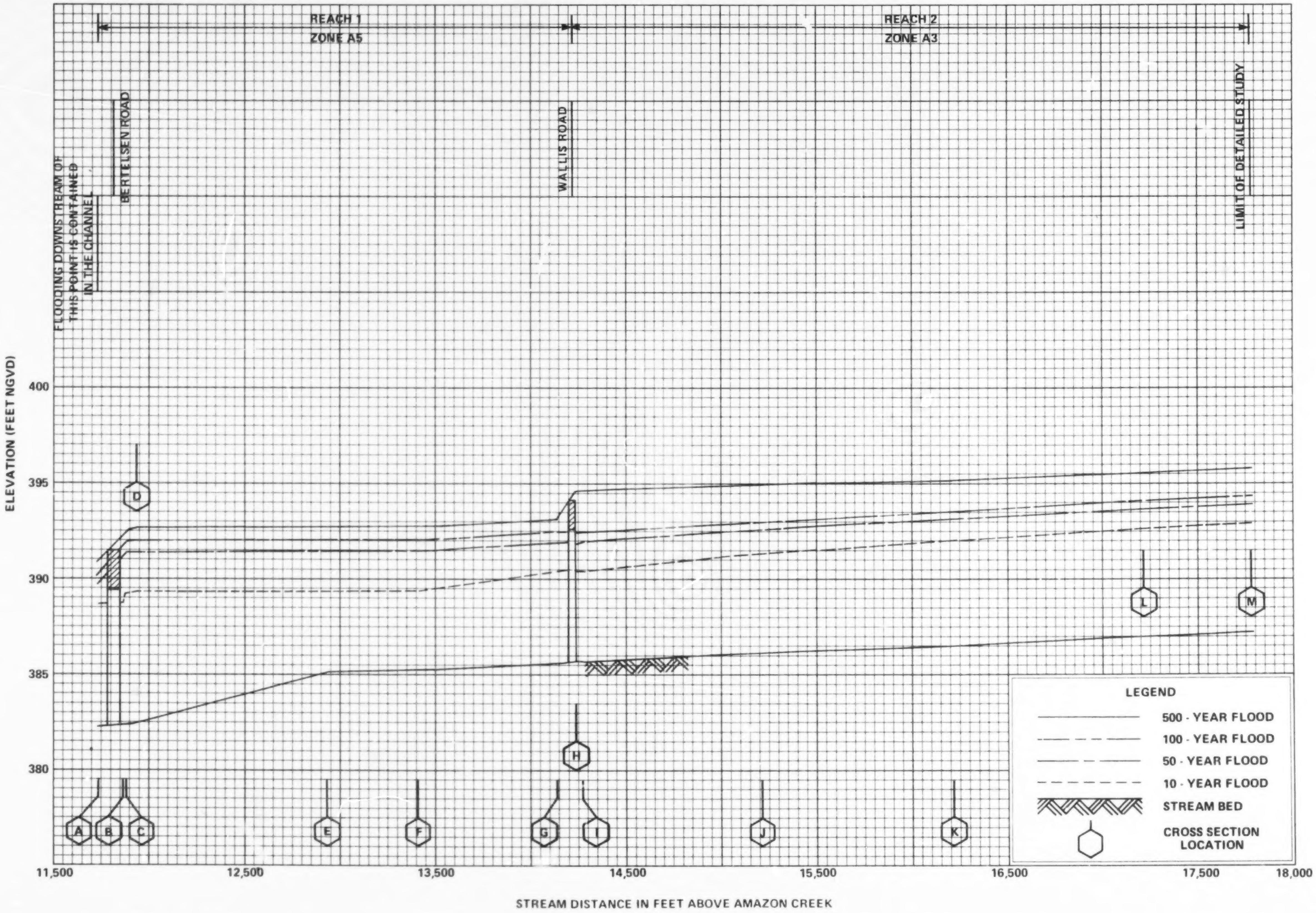
## FLOOD PROFILES

AMAZON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

17P



**FLOOD PROFILES**

CHANNEL A3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**18P**

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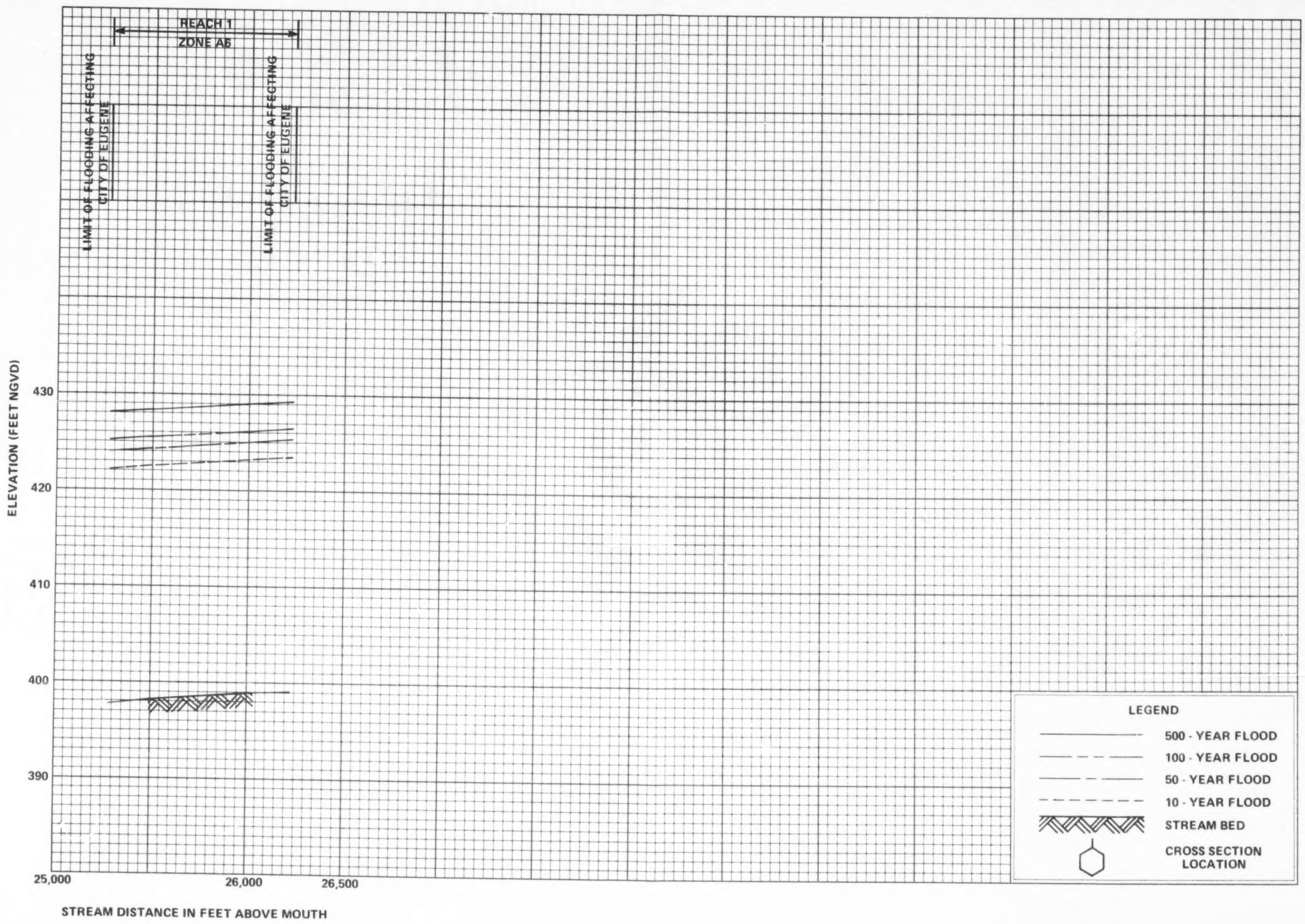

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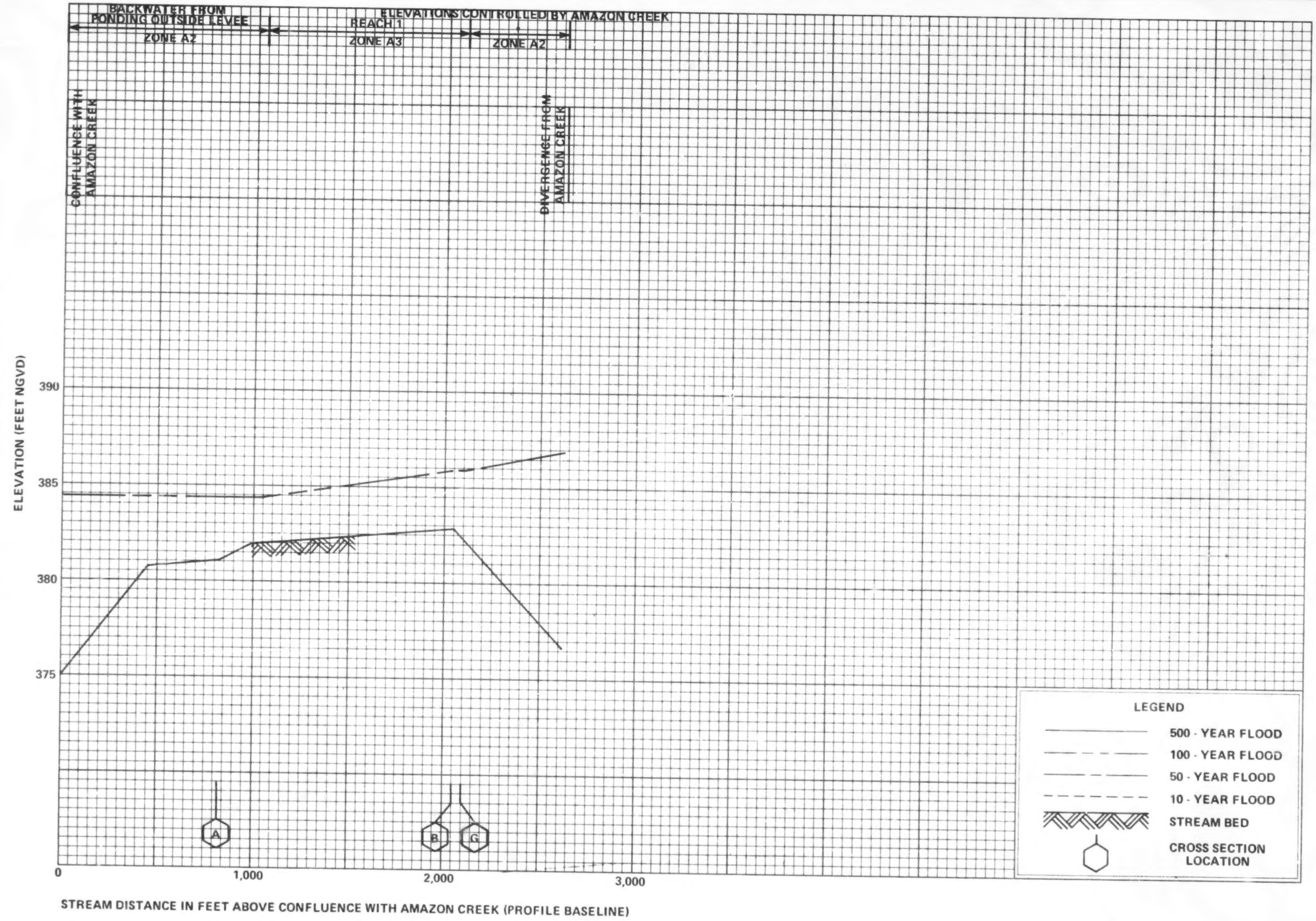
MCKENZIE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

19P



**FLOOD PROFILES**

AMAZON CREEK SPLIT-FLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EUGENE, OR
(LANE CO.)

**20P**